Medical
Region
11-7-35

The Journal of Pediatrics

VOL. II MARCH, 1933 NO. 3

Original Communications

THE PEDIATRICIAN AND PUBLIC HEALTH

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SUCH a tremendous change has taken place within the last few years in this country that it will be necessary for us to reconsider many of our activities and readjust them to meet this change. The psychology of the old period, however, is carrying on and will afford a certain obstacle to due consideration in the present one.

While I am by no means a pessimist, I feel that we must combat a spirit of expansion. For several reasons expansion is not likely to be a condition with which we shall have to deal in the immediate and possibly not in the remote future. Some fifty years ago when the last frontiers of this country were closed, an epoch was ended, but with the ending of that epoch the psychology of the people who had lived in it could not be changed immediately. That epoch constituted one of wide expansion, of glowing optimism and of marked self-sufficiency in the people of the United States.

Some of the echoes of that epoch are still resounding, and especially is this true with respect to medicine as it affects the individual. This attitude is exemplified by the reaction of the people in general to health measures and must be reckoned with. There are two other main factors as I see it which enter into the situation, both of them engendered by the World War. One is the decrease in immigration, which is giving to this country a certain stability both as to population and as to ideals, which was largely lacking a generation ago. The second is the readjustment which is taking place in the economic world and which will probably eventually result in much benefit to the country although it is hard to see that now. These tendencies place before us certain problems which must be met, and it is only by considering the deeper trends that we shall be able to arrive at a successful solution.

Read at the Meeting of Region II, American Academy of Pediatrics, Birmingham, Alabama, November 17, 1932.

As I have stated many times to members of the Academy, the question of public health and the solution of public health problems is largely a matter of ironing out the difficulties which have arisen and will arise as to the functions of the medical profession and of the health departments of our states and cities. Happily we have a starting point at either end. The medical profession is perfectly willing and anxious to have public health authorities take care of all those general measures such as food inspection, milk regulation, water analysis, etc., which constitute protective measures that can be applied in a mass and do not necessarily involve a direct relationship between the physician and the patient. On the other hand, public health authorities agree and are quite willing to have the physician take care of his private patients when they are sick. There is, of course, one exception to this statement, and that is the matter of the veterans' hospitals, which are materially cutting in on the medical practice in this country. They have not attempted to look after babies and children, so far as I know, and consequently their activities are not to be discussed by us today.

There is, however, a large field of activity in which health departments and private physicians must enter if we are to have a proper protection for the people and to raise the children of this country to a high standard of health and mentality. In general, these activities divide themselves into two groups; first, those having to do with children of preschool age, and second, those involving children of school age. These groups in turn may be divided horizontally into two groups; those who can afford to pay and those who cannot afford to pay doctors' fees. I shall not raise the question here of what constitutes ability to pay, because that is essentially an individual question and must be worked out differently in different conditions, but I would say that the general principle is held by physicians that they are willing and anxious to care for people who cannot afford to pay. This, I think, is a very well accepted principle of the medical profession. I am not certain that in all cases it is a well justified principle. I am not sure that the country or the political unit in which physicians practice is not itself bound morally to pay for the medical care of the sick poor in its region in the same way that it pays for the legal fees and other functions of the government. But up to the present time in this country there has been almost no tendency on the part of the medical profession to question any charitable work for the poor. We therefore find that the field of possible disagreement is narrowed down to two groups, the preschool group who can afford to pay, and the school group who can afford to pay.

The activities in the first group are confined largely to certain preventive measures. We should say that in no alarming manner have

the health departments in this country offered to take care of sick people if they could afford to pay. The only tendency to do this to any great extent has been the veterans' hospitals, so that we have to deal first with the preventive health measures as they affect children of the preschool age. This includes infants and likewise the newborn. We all agree that these children need attention of an individual sort for a long period of time. We agree that it is to the great benefit of the human economy that there should be a very careful regulation of diet during the early months of life. We must work out some agreement by which the means for the accomplishment of this result can be assured. The other chief measure that affects this period has to do with preventive inoculations. The problem is not essentially different and probably can be worked along very much the same lines.

The problem of the school age is somewhat different. It is not so much a matter of nutrition, but rather a matter of health. It has been a matter of physical defects largely, and the practice has been, in the majority of instances I think, to have these children examined for defects by school physicians and referred to their private physicians and dentists when such defects have been found. I do not know what the experience of others has been, but in many instances that have come to my notice, the physician who has examined these children has seemed to me to be unduly alarming in his attitude. We should be careful, however, that such physical examinations do not give a false sense of security. It would be an extremely simple thing for any one to miss a small tuberculous focus in a lung.

There is another phase of public health work among school children which is most interesting, and that is the phase which has to do with the education of the child in hygiene, health and nutrition. We are taking the child in its impressionable years. It is then that there should be inculcated proper knowledge of personal and public hygiene. It is best done in all probability by introducing into the readers and other textbooks proper hygienic suggestions and data. It is not well to try to cram down the throats of these youngsters a lot of health facts. The education must be more real because it is more insidious. It must become a natural part of what they learn rather than a separate subject for study.

We must not exaggerate the importance of the medical profession in this work; although it is probably the most important factor in the consummation of our efforts. On the other hand, as we know better than any one else, there are other factors which enter into health, both physical and mental. There is the big problem of housing, a problem which is being taken up on rather an extensive scale in Russia and to a lesser degree in Germany. The housing of our little patients makes a great deal of difference in their health. We have had brought

to our attention for the last few years the question of fresh air and sunshine. Just what part dirt plays in the health of the individual it seems to me has not been worked out properly. Whether dirty and filthy surroundings are in themselves a danger, aside from the infection which they may carry, is, so far as I know, a matter still for proper investigation. Such surroundings, however, represent usually two things, ignorance and poverty. Ignorance and poverty are the two greatest enemies of public health.

Another general problem is the question of food. Up to the time of the recent economic debacle the matter of how much and what kind of food a person needed was the important question in nearly all communities of this country. At the present time the question is how much can they get? This is especially true in the cities. If we cannot supply babies with the proper food, there is no use in having elaborate establishments and organizations to tell mothers how to feed them.

Another problem is the question of clothing. This follows very much the same line of reasoning as the others, but is probably not of nearly so much importance as the question of housing and food. In other words, no matter what the medical profession or the public health authorities may do, results cannot be accomplished without attention to these three fundamentals. After all, public health is individual health, and it is not only the individual health of the poor man and his family, but it is the individual health of the rich man and his family. Standards of life which pertain to one are more or less reflected in the other. The attitudes toward public health measures are practically the same in both groups.

We spoke previously of the effect of three factors upon public health, two of which have received our attention. The first of these was the loss of frontier. The loss of frontier with increasing population means concentration of population. It means shifting of population from agriculture to manufacturing. It means the aggregation of people into small areas under more or less unhealthy conditions. At the present time it is a noteworthy fact that among the children of our cities the mortality rate is lower than among the children living in communities and on farms outside of our cities. How can we account for this? It seems to me that the only way in which one can account for this fundamental fact is that in the smaller communities the idea of self-sufficiency of the old frontier days has maintained itself and that it has acted as a deterrent to public health measures. In other words, among American people it is not so much a matter of ignorance as it is of stubbornness, of the failure to recognize authority in any form. This is peculiarly true of medical authority. In spite of the fact that one hundred years have demonstrated beyond any question the absolute necessity for vaccination, we find that in this great country of ours public health authorities, in spite of all they can do, can-

not reduce the number of cases of smallpox below forty to fifty thousand per year. To some extent the presence in our cities of large groups of people of foreign extraction is an aid rather than a deterrent to public health activity. Many of them have come from countries where public health measures have been adopted by autocratic means. They have become used to submitting to vaccination and other measures of that sort, and consequently they have been complacent about the carrying out of these measures. While this is a temporary advantage, it is not a desirable way in which to accomplish this end. It is far better to lead a man than to push him. It is much better to carry out public health measures by means of persuasion rather than by means of law. There will always be a group of individuals who are perfectly willing to jeopardize their lives and those in their communities because of some mental aberration which makes it impossible for them to accept scientific facts. The medical profession of course must combat such evils.

After consideration of these general points, let us come back to the more specific points which we must review. What can we as a group do with respect to the newly born? How can we cooperate with the public health authorities in the reduction of the infant mortality at this age? Here much education is needed. Is it the part of the medical profession to carry on this education? In the past in my opinion we have been too loathe to impart what information we had to the layman so that he could develop the healthy viewpoint of public health measures and of private physicians. At the present time he is far more vague about medical matters than about any other scientific measure you may mention. He has a smatter of chemistry, physics and biology, but when it comes to medicine, he has nothing upon which to stand. He believes in the folklore of his childhood and the pseudo-scientific facts brought out by various groups of healers, and there is no basis upon which he can form an opinion of his own. This is peculiarly true with respect to the mortality in the first weeks of life. In the first place he should know that many of the children who die in the first week of life or are born dead are the result of an improper mating. Nor are we able in the present state of our knowledge to determine just what is wrong with this mating in the majority of instances. Something has happened to prevent the child from having the proper start in life. He does not know that the majority of deaths at this age are in premature infants, and that we do not know in the majority of instances why infants are born prematurely. He sees the efforts of the better men in the medical profession to reduce interference with normal labor, but he does not see or realize that much of the interference is caused by the demands of the mother to get it over with and in as painless a fashion as possible and as quickly as it

can be done. While in the individual case this may be justified, in the aggregate it brings about the increase in the death rate. He does not know of what great importance it is that the mother should be taken care of during her entire term of pregnancy in order to prevent some of the disturbances which may happen at that time.

When we turn from the subject of the newborn to that of the infant, we can point with pride to accomplishments. Not since the general adoption of vaccination for protection against smallpox has there been a period in medical history which has been associated with a greater drop in mortality. This drop in mortality has been due very largely to reduction in infant deaths. The factors underlying this reduction have been many. Most of the civilized countries in the world have participated in it, and many have been the agencies which have worked toward this end. While I would not in any way underestimate the effects of general public health measures, I think we are perfectly justified in attributing the great success of the crusade, if I may call it that, to the efforts of the individual physicians. I remember some twenty years ago that there existed in Chicago a Milk Commission which not only distributed good milk to the poorer families in the city, but had this milk put up in special formulas at different stations. Much to the surprise of the good philanthropists who directed this work there was no evident reduction in infant mortality in the regions thus served. Soon after this there developed from this Milk Commission the Infant Welfare Society of Chicago, and within a very few years after the introduction of individual medical care for the infant, there began to be a marked reduction in infant mortality in the regions served. This reduction has only recently seemed to reach a level.

While it is possible that some general measures, the nature of which I do not know, were responsible for some of this result, it seems to me very evident that it was the individual attention of the physician to the infant which brought about the great change. We are all proud of the results thus obtained. They have demonstrated to the world that the normal infant is best cared for by the competent physician, and that the failure to put an infant in the hands of a competent physician means taking a chance with that infant's life.

The question to be decided, however, is how far the physician should go in these charitable efforts. Because it is preventive medicine is it necessary that this service should be received free by those who are able to pay? I think not. The answer to that question rests not so much on opinion but on fundamental problems of government. When the government begins to take over for the individual and do for him those things which the individual is able to do for himself, the government tends to become socialistic. If it is intended to have a socialistic

form of government in this country, then we can have no objection to medicine participating in that change. On the other hand, we cannot exist part individualistic and part socialistic, and therefore we must work out our standards for the judgment of such conditions according to the general attitude of the public. Most people would like to get anything free if they did not realize that what they got was not worth it. In other words, I do not believe that it is possible to socialize medicine and not socialize the rest of the body politic without having a very definite decrease in the efficiency of medical work.

Aside from results in nutrition, progress in protection of infants has not been so great as we should wish. The chief cause of morbidity and mortality in the first years of life is unquestionably respiratory infection. Even in the summer months this is true over a large area of the country, but here again it is the individual attention to the individual child more than public health measures of a general nature which meet the situation.

In the preschool age the picture shifts somewhat. Certainly the nutritional disturbances are pushed into the background. Respiratory infections still maintain a prominent place, but we begin to get the effects of contagious diseases and these carry on into the school period. The problem here is to a certain extent a question of overcoming ignorance and superstition. If we could have all children immunized against diphtheria before the end of the first year, we could almost stamp out diphtheria in this country. There is some difference of opinion regarding scarlet fever, but certainly none regarding smallpox, so that our first duty is to see that as many children as possible are protected against diphtheria and smallpox. There is another angle to this whole situation, an angle which is known as well by our public health authorities, perhaps better than by us, and that is the question of the enforcement of the rules of quarantine. Under present conditions it has been my impression that the rules of quarantine have been largely prepared by some one who had a theoretical and not a practical knowledge of the diseases in question. If we are to get the best results from quarantine, we must be able to persuade the people that the rules of quarantine are reasonable, otherwise the results will be very much as we have found them to be in other circumstances, and that is the tendency to break the law will be far greater than the tendency to observe it. In other words the law is of importance only to the extent it receives the support of the governed.

The school-age problems I shall not dwell upon. They are not essentially different in their basic principles from those already discussed. Our goal is very clear. It is to promote the health of the child from birth on in every way possible. The part that the physician can play is a most important one, but it is not alone decisive.

There are many agencies which have a distinct function in reducing the morbidity and mortality in childhood. It is for us to cooperate with such agencies wherever they are found. This cooperation must be primarily with public health departments. Nor in doing this must we lose sight of the fact that it is for the good of our cause, in fact absolutely necessary for its proper solution, to maintain the dignity and strength of the medical profession. We must take into consideration the peculiar characteristics of the American people. We must do our best to educate them as to the proper methods of protecting the health of their children. We must begin in this education with the child in his early months, and above all, we must continue our efforts over long years, through discouragement and apparent failure.

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MENINGOCOCCUS MENINGITIS

A Plan of Therapy With Criteria for Recognition of Variations in the Course of the Disease

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How often and for how long a time should serum be given in the treatment of meningococcus meningitis? This is a problem faced by clinicians and one which becomes very complicated when the hoped-for favorable reaction to treatment does not occur. During the course of the disease the most common complicating situations are met with at the time when "serum sickness" occurs, or when the disease seems about to assume a chronic course. It is particularly at such times that the clinician must decide whether serum treatment should be discontinued, whether a different strain of serum should be used, or whether another site of injection should be selected.

The purpose of this paper is to illustrate by cases these problems, their recognition, and management according to our experience. Certain guides that have been of greatest value to us will be emphasized.

Table I

Summary of Cases of Meningococcic Meningitis Treated in the Pediatric Service of the Long Island College Hospital (1924-1931)

Total number of cases	53	
Recovered	37 (70%)	
Died	16 (30%)	
Of the 16 deaths: 8 died within 24 hours of admission to the hospital. Omitting these, there remain 8 deaths of a total of 45 cases (18% mortality)		
Of the recovered group:		
Complete	28 (76%)	
Sequelae	9 (24%)	
Bilateral 8th Nerve Deafness		5
Internal Strabismus		2
Iritis		1
Hydrocephalus		1

Method of Serum Administration and Clinical Experience Illustrating Its Use

It has been our plan to inject serum twice daily for the first few days of treatment and then to modify this procedure as our criteria might indicate. Amoss[1] has shown that when immune serum is injected intraspinally into monkeys, the antibodies (agglutinins) are very much di-

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Submitted for publication, Sept. 20, 1932.

minished after eight hours and have practically disappeared in twelve hours. On this basis certain workers have administered serum every eight hours. Neal,[2] on the other hand, has advocated the use of serum but once a day. She feels that serum acts directly on the organisms as well as to stimulate the phagocytic action of the cells. By her plan, the serum remains twenty-four hours in the cerebrospinal system as a more frequent withdrawal of spinal fluid would remove the phagocytic cells which combat the meningococci.

When a meningococcus bacteremia can be recognized, with or without meningitis, serum should be given intravenously, as Herrick[3] has suggested. However, the majority of our patients have usually been ill for several days prior to hospitalization and the meningococcus could rarely be cultured from the blood stream at the time of admission. In 23 cases we failed to recover the organisms by blood culture although the spinal fluid culture was positive. Because of these facts and the dangers of anaphylaxis, we have refrained from injecting antimeningococcic serum intravenously.

In the period of 1924 to 1931, we have treated a total of 53 children. We may divide our cases into three groups:

I. Hyperacute or Untreated.
II. Ordinary Acute Type.
III. Posterior Basic.

After a presumptive diagnosis of meningococcus meningitis has been made from the history and physical examination, lumbar puncture is performed. The following data is obtained:

1. Clarity of the fluid.
2. Spinal fluid pressure in terms of millimeters of mercury.
3. Number of cells per cubic millimeter and differential count.
4. Direct smear and culture for meningococci (Gram stain).
5. Spinal fluid sugar determination.

In addition thereto, a complete blood count and blood culture are made.

If the fluid from the original puncture is turbid, New York State Board of Health antimeningococcus serum is administered. The usual amount is about 20 c.c. which is given following the removal of at least that amount of spinal fluid. The serum is allowed to flow in by gravity. Unless a history of "protein sensitivity" is obtained, the preliminary testing for horse serum susceptibility is not done.

I. Hyperacute or Untreated Cases.—This included all cases with acute onset who died within twenty-four hours of hospitalization. There were 8 such cases. We shall not discuss these cases, since they died before there was opportunity to inject any serum, or at best, one dose.

II. Ordinary Acute Type.—In this type we have followed our reported admission routine. The criteria which we have adopted to determine when serum therapy should be discontinued are:

1. Two successively negative spinal fluid cultures when these have previously been positive.
2. Return of the spinal fluid sugar to normal when this has been decreased.
3. Diminution of the total white cells in the blood toward the normal.
4. Reduction of the number of cells in the spinal fluid toward the normal.

The appearance of the patient, reduction in the symptoms of meningeal irritation and fall in the temperature are correlated with the above criteria. The following cases will illustrate the use of the above guides:

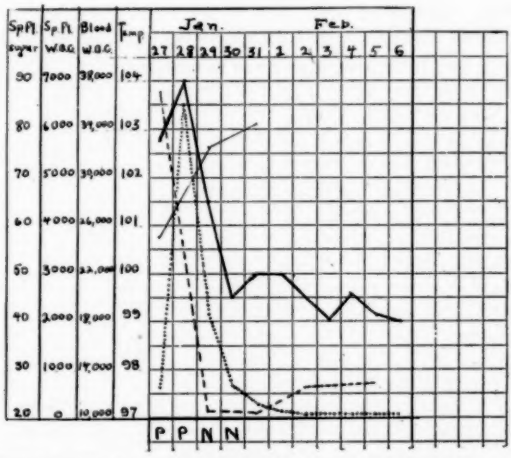

Fig. 1.—(Case 1.) The heavy solid line represents the temperature; the solid light line, the spinal fluid sugar; the dotted line, the spinal fluid cell count; the broken line, the white blood cell count. *P*—positive for meningococci; *N*—negative for meningococci.

Note the correlation of the various factors indicating recovery.

Case 1.—R. H., a white male child, aged four years, was admitted to the Long Island College Hospital on January 27, 1930, because of fever and convulsions of one day's duration. Two sisters had been ill with meningitis several months before. The physical examination revealed a well-developed, acutely ill male child, with a generalized petechial rash. The child was drowsy and irritable when aroused. There was moderate neck rigidity. The extremities were spastic with increased tendon reflexes and a positive bilateral Kernig sign. The throat was congested. The remainder of the physical examination was negative. Reference to the chart in Fig. 1 will show the relationship of the various criteria utilized as an aid in treatment. On the day of admission, January 27, 20 c.c. of serum were administered twice, by lumbar route. This was repeated on the next day. On the succeeding two days but one injection of serum was given. At this time the temperature had fallen to normal and the spinal fluid cultures were negative for meningococci. The blood and spinal fluid cell counts had returned toward normal.

The spinal fluid sugar, although normal to begin with, rose during treatment. Serum reaction occurred on the sixth day, but there was no particular clinical disturbance or change in the laboratory findings. The patient made an uneventful recovery.

CASE 2.—P. H., a white female child aged eighteen months, was admitted to the hospital on April 25, 1930, because of fever, vomiting, stiff neck and lethargy. These complaints had been present for four days. The physical examination revealed a well-developed and well-nourished female child, acutely ill but oriented. The neck was rigid, the extremities were spastic with increased reflexes, and a positive Kernig's sign was present. Serum was administered twice daily, 20 c.c. at each injection until April 29. The patient showed marked clinical improvement which was accompanied by a fall in the spinal fluid cell count, white blood count and temperature. The cultures of the spinal fluid were still positive. At this time a reversal occurred which was associated with the onset of serum sickness (see Fig. 2). Following this, the patient showed favorable clinical response

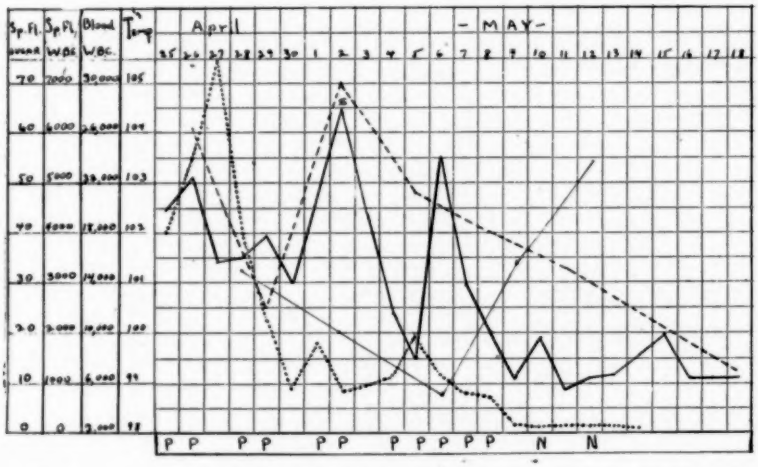

Fig. 2.—(Case 2.) The heavy solid line represents the temperature; the solid light line, the spinal fluid sugar; the dotted line, the spinal fluid cell count; the broken line, the white blood count. *P*—positive for meningococci; *N*—negative for meningococci; *S*—serum reaction.

Note especially the course of the spinal fluid sugar.

which was substantiated by the laboratory data. Owing to the persistently positive spinal fluid cultures and the reduction of the spinal fluid sugar to 8 mg., an agglutination test was done. Both the New York State and Massachusetts serum were tested by the laboratory. Neither serum showed a marked degree of potency. In view of the fact that the Massachusetts serum agglutinated in higher dilutions, it was used in place of the New York serum. This was begun on May 6 and continued through May 12, one injection daily. The spinal fluid sugar rose from 8 mg. to 33 mg. and then to 54 mg. There was likewise a negative spinal fluid culture and reduction in the blood and spinal fluid white cell counts. The patient recovered without sequelae.

This case illustrates the fact that the clinical appearance alone cannot be depended upon as a guide as to when serum should be discon-

tinued. It likewise suggests that agglutination tests for the potency of serum used should be done early in the course of the disease, although no definite correlation between the agglutination power and efficacy in treatment has been demonstrated.[4]

CASE 3.—L. C., a white female child, aged three years, was admitted to the Children's Ward on December 13, 1930, because of fever, headache, vomiting, and abdominal pain. Her family and birth histories were negative. Two weeks prior to admission, this patient had complained of headache, stiff neck, and abdominal pain. Her temperature at that time was 106° F. There was associated vomiting. She had had some swelling of her elbows and knees with associated pain but no redness. Because of the latter complaint, she was treated for rheumatic fever. On admission, the patient was drowsy and acutely ill but responded to stimuli. Her neck was rigid and tender. The tonsils were diseased. There were present a bilateral clonus, positive Babinski, Kernig and Brudzinski. The lumbar puncture revealed a cloudy spinal fluid with 425 cells, smears and cultures being positive for

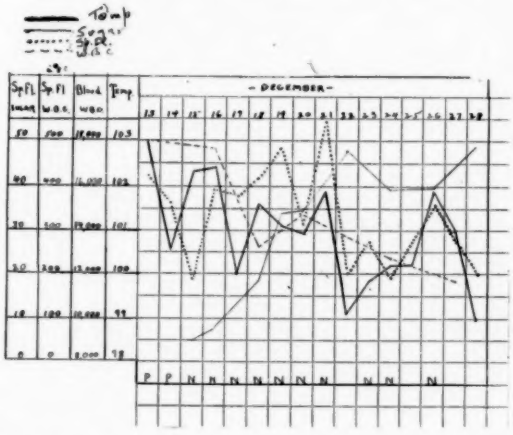

Fig. 3.—(Case 3.) The heavy solid line represents the temperature; the solid light line, the spinal fluid sugar; the dotted line the spinal fluid cell count; the broken line, the white blood cell count. *P*—positive for meningococci; *N*—negative for meningococci.

Note the rise of the spinal fluid sugar with recovery of the patient.

meningococci. The patient was given serum twice daily for the first few days and then daily. She made an uneventful recovery. Reference to Fig. 3 indicates how closely the course of the spinal fluid sugar has paralleled the progress toward recovery of the patient.

III. POSTERIOR BASIC TYPE.—This occurs most often in infants. Two physical findings we have found to be most indicative and reliable have been a bulging anterior fontanelle and neck rigidity. These cases are most likely to become chronic with the accompanying risk of complications and sequelae. Especially in this type the primary consideration is to get at the inflammatory exudate early and directly. We have, therefore, administered our serum through the cisternal route from the onset. Where there has been diminution of the flow of the spinal

fluid from the cistern, we have resorted to ventricular punctures with serum administration. It has been demonstrated that the primary source of infection is in the ventricles by way of the choroid plexus.[5] The meningococci survive in the ventricles because of lack of cells which originate from blood or connective tissue, so that only when the organisms pass into the subarachnoid space does phagocytic action occur. Lyons[6] has combined ventricular injections of large amounts of serum with simultaneous drainage of the spinal fluid from the lumbar canal. Theoretically, ventricular puncture would be preferable, but since there are conflicting opinions as to the injury done to brain tissue by insertion of a spinal puncture needle, we have preferred to do cisternal punctures when possible. In some of our recent cases when there has seemed to be a cisternal block, we have injected small amounts

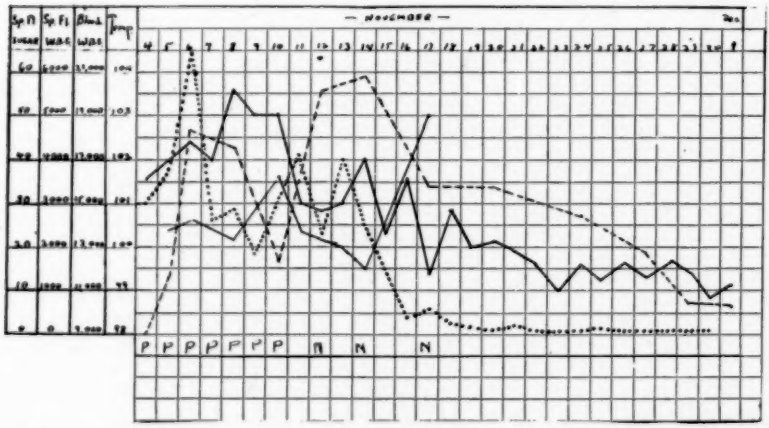

Fig. 4.—(Case 4.) The heavy solid line represents the temperature; the solid light line, the spinal fluid sugar; the dotted line the spinal fluid cell count; the broken line, the white blood cell count. *P*—positive for meningococci; *N*—negative for meningococci.

Note the interrelation of the various criteria, especially the course of the spinal fluid sugar throughout the illness.

of air (5 to 10 c.c.) through the cistern and have noted a marked increase in the flow of cerebrospinal fluid following each air administration. Siegl[7] had injected air by way of the ventricle and felt that its administration helped in the diffusion of the serum, in draining of the cerebrospinal fluid and the breaking up of adhesions.

Case 4.—M. G., a white female infant, aged three months, was admitted to the Children's Ward on November 4, 1930, because of refusal of food, drowsiness, fever and fixed stare of the eyes. This syndrome was present for two days prior to admission. The examination showed an acutely ill female infant apparently gazing into space. The neck, spine and lower extremities were markedly rigid. The anterior fontanelle was tense and had a definite pulsation; a positive McEwan sign was present. The reflexes were diminished. Serum was injected twice daily for five days by cisternal route. At this time the fontanelle was flat, neck rigidity

had lessened and the reflexes were active. The blood and spinal fluid cell counts had diminished but the temperature had increased and the spinal fluid sugar had fallen from 26 mg. to 22 mg. Cultures of the spinal fluid were still positive. A change was made to Massachusetts State serum, which was administered once a day. In the early stages of treatment, we were unable to obtain fluid by cistern and resorted to the injection of small amounts of air. We observed that following this procedure there resulted a much better flow of spinal fluid. After the injection of air roentgenograms were made. The first showed a moderate degree of

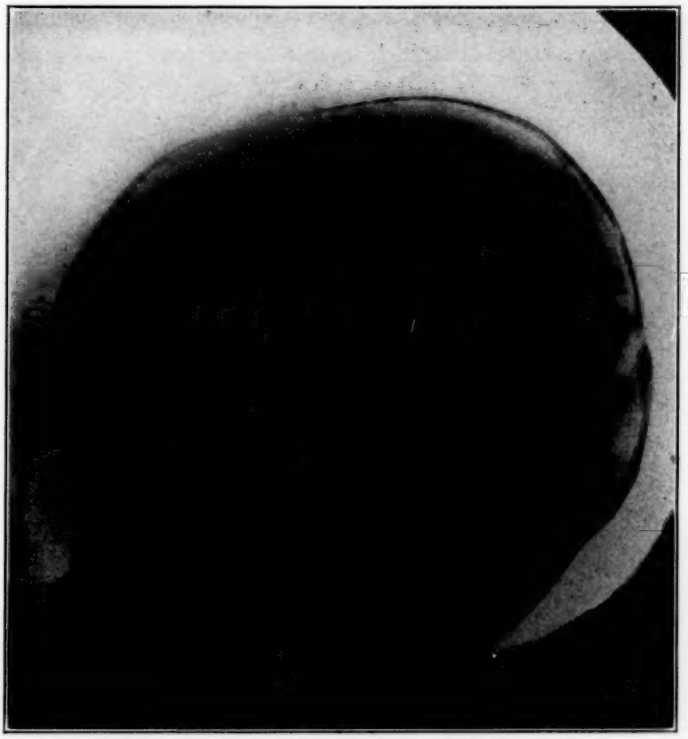

Fig. 5.—(Case 5.) Encephalogram, taken three weeks following onset of a meningococcus meningitis. Note dilatation of lateral ventricles and absence of air in the subarachnoid space.

ventricular dilatation. Upon repetition of this procedure, the x-ray showed a normal ventricle. This early dilatation of the ventricles would seem to correlate with the bulging fontanelle, as evidence of an early invasion with increased ventricular pressure. This patient made an uneventful recovery. Reference to the chart, Fig. 4, shows again how closely the spinal fluid sugar forecasts the progress of the patient as well as the interrelation of the various criteria.

CASE 5.—J. M., a white male child, seven months of age, was admitted to the Children's Ward on November 1, 1930, because of irritability, restlessness and fever. Three weeks prior to admission, he became irritable and refused to nurse. He seemed feverish. This continued for two weeks, at which time stiffness of the

neck became marked and swelling of the "soft spot" on the head was noted by the parents. The patient was seen by several physicians but the diagnosis of meningitis was not made until admission to the hospital. The initial examination revealed a well-nourished child who exhibited clonic movements of the lower extremities. The anterior fontanelle was bulging, the neck was rigid. There was a positive McEwan's sign over the right parietal area. The pupils were fixed and the patient was apparently hyperaesthetic. The admission lumbar puncture produced only a few c.c. of fluid. Cisternal puncture was then resorted to with the same result. Thereupon, air 70 (c.c.) was injected fractionally, 5 to 10 c.c. at a time by cisternal route. It was noted that following each administration of air

Fig. 6.—Encephalogram of same case, taken prior to recovery indicating residual hydrocephalus.

the spinal fluid would flow more freely. This permitted sufficient removal of turbid fluid. An encephalogram (Fig. 5) showed a marked dilatation of both lateral ventricles with absence of air in the subarachnoid space. The sutures were markedly separated at this time. On November 11, ten days after treatment began, a serum reaction occurred. The clinical picture and our criteria suggested improvement up to November 19, at which time the cell count in the spinal fluid rose to 1500 and the spinal fluid sugar fell to 12 mg. There was an associated rise in temperature. Serum was readministered for a few days and cultures of the spinal fluid were taken. These were reported negative, by which time the reaction had subsided. On November 25, an encephalogram (Fig. 6) showed an increase in the ventricular dilatation. The patient was discharged, cured of his meningitis

but had a residual hydrocephalus. This case illustrates the necessity for early diagnosis and treatment to avoid such complications as hydrocephalus.

In certain instances, cisternal air injection is unsuccessful, in which case intraventricular serum administration must be resorted to.

CASE 6.—W. G., aged three and one-half years, white, was admitted to the Children's Ward on May 23, 1929, because of headache, earache, vomiting and fever of three days' duration. Examination showed an acutely ill, drowsy child. A left internal strabismus was present. The tonsils were hypertrophied and diseased. Marked neck rigidity and positive Kernig's sign were present.

The lumbar puncture revealed a cloudy fluid, under pressure. There were 1440 cells, 90 per cent of which were polys. The patient received serum twice daily until May 30. Up to this time, he seemed to be improving. However, on the 30th and 31st, insufficient spinal fluid was obtained by cistern or lumbar puncture; nor could serum be introduced. Co-incidently, the patient's temperature rose, he became quite drowsy and our criteria indicated a relapse. For this reason, an opening was made over the mid-right parieto-occipital region under local anesthesia and the posterior horn of the right ventricle tapped. Forty c.c. of fluid were removed and serum administered. This procedure was repeated once daily for several days, with marked improvement. With drainage restored, cisternal and lumbar punctures were again resorted to. The patient's symptoms cleared up except for a right internal rectus paralysis.

DISCUSSION

Immediately following the first injection of serum, the cerebrospinal fluid becomes more turbid and the cell count is increased. (See Figs. 1, 2, 4.) This is the characteristic meningeal reaction to a foreign protein (horse serum). With treatment, the fluid becomes clearer and the cells decrease. About the fifth to seventh day, the patient appears to be suffering a relapse, the temperature rises, the symptoms are aggravated, and there are present, erythema, urticaria and joint pains. This is a "serum meningitis." The cell count of the spinal fluid is increased. If organisms are absent and the spinal fluid sugar has not become definitely diminished, serum should not be administered. If, however, our criteria have indicated a relapse, as shown by a return of positive spinal fluid cultures, fall in the spinal fluid sugar, and rise in both the spinal fluid and white blood cell count, serum is readministered as meningococci are probably still present somewhere in the ventricular system. In this instance cisternal approach permits of more direct therapy. In the event that serum has been administered by lumbar route and the flow becomes blocked because the lumbar culdesac has been obstructed from the ventricle, serum should be administered by cisternal puncture. When there is obstruction at the cistern, and spinal fluid cannot be obtained, nor serum be injected, fractional injections of air should be resorted to in an effort to promote drainage of the cerebrospinal fluid. This failing, the ventricle should be drained and serum administered. In older children, the skull must be trephined.

Another consideration in therapy is the use of the proper serum. Early in the course of the disease, the spinal fluid is tested for agglutination with New York State serum. Irrespective of the agglutination titer, every case is given a therapeutic test, and if our criteria indicate no change for the better, a change of serum is made. Vaccine therapy has also been urged in chronic cases.[8] Our experience with this procedure is too limited for comment.

As an aid in prognosis, we have followed the level of the spinal fluid sugar and found this to be of great value during treatment. Blood-sugar determinations have always been done simultaneously. However, various investigators have shown this latter to be an unnecessary refinement. The spinal fluid sugar is followed carefully to observe variations in its level. It is in this latter sense that aid is given. In Cases 2, 3 and 4, study of the charts has shown how closely the spinal fluid sugar determinations have paralleled the course of the illness. From our studies we have felt that a rise toward the normal of an initially low spinal fluid sugar means a favorable prognosis. Both McLean and Caffey[9] and Musser and Watkins,[10] in a group study of the spinal fluid sugar had come to a similar conclusion.

We have been unable to verify the observation of the steady fall of the spinal fluid sugar level in fatal cases, as shown by Musser and Watkins, because none have occurred since this point was looked for. By the use of a series of spinal fluid determinations correlated with the other criteria, a much better and quicker decision can be made as to the method of procedure in the treatment of the individual case.

SUMMARY

1. A plan has been offered for treating cases of meningococcus meningitis and criteria given for estimating the success of therapeusis.

2. Emphasis has been laid on the use of spinal fluid cultures and repeated estimations of the spinal fluid sugar level, to decide whether a change in procedure is necessary.

3. Air injection, as a therapeutic aid, was sufficiently helpful to suggest further case studies.

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159 CLINTON STREET.

TUBERCLE BACILLI IN THE SPUTUM OF CHILDREN FREE FROM MANIFEST PULMONARY TUBERCULOSIS

(As Determined by Examination of Gastric Sediment)

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THAT open pulmonary tuberculosis may occur in children with little if any local or constitutional manifestation is a well-established fact. Its recognition offers, under these circumstances, no little difficulty because it must necessarily rest upon the identification of the tubercle bacillus in the sputum. It is difficult to collect sputum in the usual manner because of the inability on the part of patients of immature age to expectorate.

In 1898, Meunier conceived the happy expedient of recovering the sputum of children by means of gastric lavage, thus making the search for the tubercle bacillus in this type of patient possible. Nobécourt,[1] Marfan,[2] Armand-Delille,[3] Poulsen and his associates,[4] Wallgren,[5] Kereszturi and her coworkers[6] have found this procedure practicable. Their investigations have shown that homogenization of the gastric sediment yields more satisfactory results than when this modification is not resorted to. Nearly all workers agree that optimum results can be achieved by the guinea-pig inoculation of the homogenized gastric contents.

The aforementioned authors report in most instances a high incidence of tubercle bacilli in the gastric washings of children, doubtless because a large percentage of the patients investigated were manifestly subjects of tuberculosis. Their conclusions, therefore, cannot be accepted as an accurate index of the frequency of positive sputum in children without active pulmonary tuberculosis. In order to make such determination, the investigation must be limited, a precaution scrupulously observed in our study, to children demonstrably free from this affection.

MATERIAL CONSTITUTING THE PRESENT STUDY

Gastric washings were performed upon sixty-six children, thirty-five boys and thirty-one girls, in residence at the Children's Division of the National Jewish Hospital, comprising the preventorium and the department for active cases. This number includes six children with adult type of pulmonary tuberculosis, verified by the recovery of tubercle bacilli from their sputum upon ordinary examination. Ex-

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cluding these six there remain sixty cases, thirty-four boys and twenty-six girls, who constitute the material for this study. Their ages ranged from four years to fifteen years, with the largest number belonging to the six to twelve year age group. Admission to the preventorium was determined by evidence of one or several of the following conditions: intimate contact with tuberculosis; a state of malnutrition; moderate febrile manifestation; anorexia; a positive tuberculin reaction. The material from the department for active cases consisted of nine children with joint tuberculosis, but no evidence whatsoever of pulmonary involvement.

Of the entire number included in the study 20 per cent were malnourished, 52 per cent were known contacts, and 15 per cent had joint tuberculosis. A positive tuberculin reaction—intracutaneous test—was present in 73.3 per cent. Twenty-six and seven-tenths per cent yielded negative results to repeated tests, including the injection of 1 mg. O. T.

A careful physical examination of the chests of these sixty children disclosed no findings suggestive of pulmonary tuberculosis. The erythrocyte-sedimentation-rate, determined in each preventorium child, afforded nothing of diagnostic or prognostic importance.

One or several x-ray films were taken of each child. With rare exception only anteroposterior exposures were made. Fifteen children presented evidence of the nodular type of infection; one represented a first infection; one a probable fibrosis of a single lobe; six were classified as questionable nodular cases; thirty-seven showed no findings other than those commonly seen in children of the same age with no suspicion of tuberculous infection. Of the fifteen children with positive roentgenologic signs, 13, or 86.7 per cent, showed a positive tuberculin test; and of the thirty-seven with negative x-ray findings, 23, or 62 per cent, were reactors.

MODE OF PROCEDURE

The technic adopted in our work conformed essentially to that described by Poulsen and his coworkers. A detailed description is undertaken to demonstrate its simplicity and practicability. The gastric contents were extracted in the morning before any food or even water had been ingested. The patient was encouraged to cough rather vigorously and a pharyngeal swab was obtained and subsequently stained for tubercle bacilli. With the child in the recumbent position, a sterilized 14 French stomach tube with the tip lubricated was introduced through the nostril well past the cardiac orifice. Difficulty was encountered in only two cases, owing to deviated septum and hypertrophy of the inferior turbinates, necessitating the introduction of the tube through the mouth. The greater number experienced only the slightest discomfort from the manipulation, and restraint was found necessary only in a few of the younger children. Fifty to 75 c.c. of warm normal salt

solution or sterile water was introduced by gravity or with an asepto syringe and siphoned or aspirated, repeating the process until a total of 400 c.c. of the solution was thus used. Siphonage, when retarded or impeded was facilitated by coughing, change to a sitting posture, introduction of air, or by slight withdrawal or deeper introduction of the tube. The entire procedure consumed approximately fifteen minutes. The syringes, bulbs, and containers for the siphoned contents were sterile. The hands of the operator were washed before and after each lavage. The extracted contents, 300 to 400 c.c. in volume, containing variable amounts of mucus and pus, were kept at ice-box temperature until the following morning, when the operation was repeated in the same manner, and the two washings pooled.

The gastric contents thus obtained on two successive mornings were centrifugated for ten minutes at a speed of 10,000 revolutions per minute. The sediment was digested with an equal volume of 2 per cent sodium hydroxide at 37° C. for twenty minutes, washed three times in physiologic saline solution and a specimen thereof stained for tubercle bacilli.

About 2 c.c. of the sediment was injected subcutaneously into the inguinal region of a guinea pig and a like amount into its peritoneal cavity. We had ascertained that the tubercle bacilli were neither biologically nor morphologically affected when the gastric washings were permitted to remain at ice-box temperature for five days.

As soon as definite enlargement of the inguinal glands was detected, a small incision was made and the material obtained carefully studied for tubercle bacilli. If the guinea pigs survived an observation period of twelve or more weeks, they were chloroformed and autopsied.

RESULTS OF INOCULATION

Seven of the sixty-six pigs inoculated with the gastric washings revealed manifestations of tuberculosis. Enlargement of inguinal glands became evident in from twenty-six days to six weeks. Three of these pigs succumbed to the infection in from two to four months after inoculation. The remaining four were autopsied after an observation interval of four to five months.

Five of the guinea pigs owed their infection to the inoculation of washings from children having an adult type of pulmonary tuberculosis with positive sputum. These are of course, for obvious reasons, excluded from the series. The sputum of the sixth child with this type of tuberculosis had become bacilli-free as a result of an induced pneumothorax.

The gastric sediments of two of the sixty children comprising the material of this investigation produced tuberculosis in the injected animals.* The inoculations were repeated four months later, with

*Investigation of a similar group of thirty-one children is now in progress with results closely approximating these figures.

identical results. The two children in question were boys eight and nine years of age respectively. Both were Colorado born, the infection was traceable in each instance to the father, both were healthy in appearance, well-nourished, enjoyed excellent health, were at all times fever-free, had neither cough, expectoration, nor susceptibility to colds, each showed a positive tuberculin test to $\frac{1}{10}$ mg. O. T. and only questionable tracheobronchial node enlargement roentgenologically. In each instance a smear of the homogenized sediment of the gastric washings proved negative for tubercle bacilli.

SUMMARY

In a group of sixty children, fifty-one of whom were admitted as preventorium patients and nine for tuberculosis of joints, two children —representing 3.33 per cent of the entire population, or 4.56 per cent of those with a positive tuberculin reaction—showed tubercle bacilli in their sputum. Forty-four in the group were tuberculin reactors and only seventeen presented definite roentgenologic evidence of childhood type of infection. No child in the series revealed clinical or radiographic evidence of pulmonary infiltration.

The two children in whose sputum tubercle bacilli were discovered differed in no way from their associates. Each of these two gave a history of contact with the tuberculous, was a reactor to tuberculin, had only questionable radiographic evidence of nodular type of infection and was free from cough, expectoration, fever and tendency to colds.

The tubercle bacilli could not be detected by examination of a pharyngeal smear obtained after forced coughing, nor by means of the direct examination of the homogenized sediment of the gastric washings. They were found only upon guinea-pig inoculation of the homogenized sediment of their gastric washings.

An interesting and unexpected observation was the failure to discover tubercle bacilli in smears of the homogenized gastric washings of the five children with adult type of pulmonary tuberculosis and with sputum repeatedly positive for tubercle bacilli by ordinary methods—indicating no doubt that properly trained sanatorium patients do not, to any appreciable extent, swallow their sputum.

DISCUSSION

Our study based upon the gastric washings of a group of children of the preventorium type confirms the observations of others that the most reliable method of finding tubercle bacilli in this class of patient and in infancy is the examination of the gastric sediment.

However, the examination of the sediment alone, even if homogenized, may fail to disclose tubercle bacilli, though unmistakably present in the sputum, contrary to the experience of a number of investigators.

The guinea-pig inoculation of such sediment constitutes the most reliable method of detecting the tubercle bacillus.

It is desirable in the event of an initial negative outcome, to repeat the inoculation if possible, two or three times.

The most significant finding in our study, confirming that of other investigators, and seemingly recognized by comparatively few in the profession, is the discovery of tubercle bacilli in the sputum of tuberculin-positive children who betray no clinical or roentgenologic evidence of tuberculosis of the lungs.

On this basis it appears justifiable to assume that a small percentage of children in every group of positive reactors has tubercle bacilli containing sputum, even in the absence of cough or expectoration or other symptoms or signs of active pulmonary tuberculosis.

The astonishingly high percentage of children with tubercle bacilli in their gastric contents recorded by a number of observers can readily be accounted for by the inclusion in their studies of subjects with manifest tuberculosis.

CONCLUSIONS

What conclusions or recommendations are permissible on the basis of our findings? Are these apparently healthy children with tubercle bacilli in their gastric washings to be regarded as actual disseminators of tubercle bacilli, or do they become disseminators only when in consequence of a respiratory infection, cough or possibly expectoration is initiated?

What potentialities for trouble, if any, can be discerned in the uncontrolled elimination of tubercle bacilli—few in number to be sure—in the stools of these children with the inevitable contamination of their hands?

In our present state of knowledge judgment cannot be rendered. Further research is necessary to elucidate this question. Pending such investigation we must bear in mind that such children may be capable of spreading tuberculosis.

Acknowledgment is extended to Mr. Wainhouse and Mrs. Rose of the clinical laboratory staff of the National Jewish Hospital for their attention to time-consuming details involved in the study of the sediments. Assistance was likewise rendered by Drs. Louisa T. Black and I. Singerman and Mrs. Alice Gresham. We are indebted to Dr. I. D. Bronfin, medical director, and to the management of the hospital for placing at our disposal the facilities of the institution.

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THE BLOOD PICTURE IN PERTUSSIS
A GRAPHIC STUDY

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WHOOPING cough, because of its high infant mortality, its tendency to pave the way for other invaders, and its unsuspected early infectivity, constitutes one of the most stubborn foes that pediatricians are called upon to combat. Furthermore in spite of a vast literature on the subject of pertussis, relatively little is known about it, the disease remains comparatively unresponsive both to prophylaxis and treatment, and few cases are diagnosed sufficiently early to insure efficient isolation.

The organization for investigation of the whooping cough cases under the care of the Communicable Disease Department of Children's Hospital, therefore, needs no other justification. The study consists of a survey of old records, observations on active cases in a thrice weekly clinic and special studies on bed patients with complicated forms of the disease. Of such work this paper represents a report on the first blood studies.

As a basis for a better understanding of this survey a brief outline of the disease is indicated. It is convenient to divide uncomplicated whooping cough into four stages. First, the incubation period lasting from two to three weeks, during which time the patient is free from symptoms. Second, the catarrhal stage of ten to fourteen days' duration, most often characterized by a cough which is insidious in onset, not diagnostic in character, but highly infectious. Third, the whooping stage usually of two to three weeks' duration when the cough is characteristic. Fourth, convalescence with gradual subsidence of symptoms and disappearance of the infective organism.

Blood studies in pertussis are of more than academic interest. The disease is difficult to diagnose early and is most infectious at this stage. Any diagnostic aid, therefore, that could be applied sufficiently early to permit prompt isolation would materially aid in combating infection with its resultant high infant mortality. It is chiefly with a view to early diagnosis that blood studies have been made in the past. There is considerable controversy in the literature regarding the value of early blood counts as a diagnostic aid.

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Fröhlich[1] in 1897 was probably the first to draw attention to the increase in white cells in whooping cough. His findings were based on a single count in all but a few patients. In the following year, Meunier[2] published a more complete study. He drew his material from an isolation center to which children with uncomplicated cases were admitted, many in the earliest stages. His report includes a study of thirty such cases controlled by a group of children with spasmodic bronchitis, tuberculosis, and tracheobronchial adenopathy. He used as his normal white counts an upper limit of 13,000 in infants and decreased this for each year until at eight years of age the child's blood picture approached that of the adult. In his pertussis cases, each child showed an increase in leucocytes which did not drop to normal until the end of the disease. Lymphocytes generally were much increased. The control cases showed comparatively low counts.

Leitner,[3] on the basis of a study of 200 cases since 1914, many in the earliest stages, found an increase in leucocytes even in the catarrhal stage. It was slight but showed a steady daily rise and was usually accompanied by an increase in lymphocytes, the ratio of lymphocytes to polymorphonuclear cells increasing 3 to 1 in the paroxysmal stage. It was demonstrable in all cases studied and he depended on blood counts exclusively for diagnosis even in the earliest stage. Schneider[4] and Hillenberg[5] reached similar conclusions. McGee[6] states that the blood count may be of value in early diagnosis.

On the other hand Lasch, Fischer, and Miemitz[7] in a report of 28 cases, many of whom had been under observation for several weeks before the onset of the whoop, consider the blood count of little value until the paroxysms are established. Their work is criticized by Leitner[3] who feels that the blood counts were done at too long intervals to warrant a conclusive opinion.

Hess,[8] Reiche[9] and Finkelstein[10] all agree that the blood count is not definitely diagnostic until the third week. Cozzolino[11] is also of this opinion. Kleinschmidt[12] warns against drawing false conclusions from low early blood counts. Sauer[13] found little variation from normal during the catarrhal stage and even reports a leukopenia in the initial and terminal stages. He considers the blood count of doubtful early diagnostic value.

Even though a great deal of work has been done on blood studies by many different observers, the information is still confusing. The study is not difficult but it is tedious to the doctor, the mother, and the patient to continue blood counts over a period of five or six weeks and this alone probably accounts for the dearth of consistent information. At our pertussis clinic we have undertaken this tedious task, and the interesting results have repaid us amply for the effort. For the sake of uniformity practically all counts have been made by one of us (H. H.). The patients have been asked to return three mornings a week. In addi-

tion to blood counts a note has been made of the onset of the cough and a comment at each visit as to the severity and frequency of the whoop. Many come in late in the disease when the cough is well advanced. Early counts are less numerous therefore than late ones. The counts have been studied graphically as illustrated in the charts that follow.

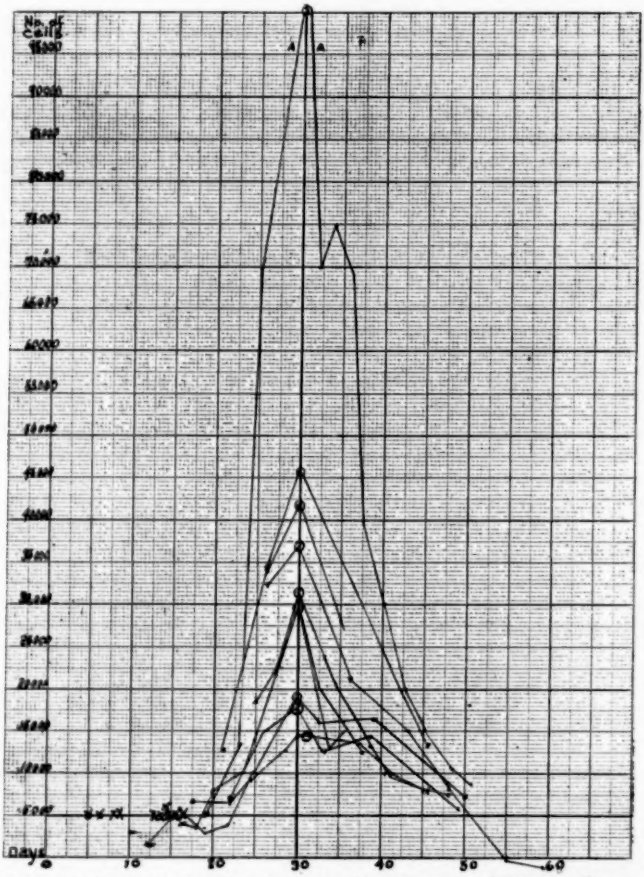

Chart I.—Represents the lymphocyte curves of pertussis in children eighteen months to seven years. (X) indicates the day of onset of the cough and (O) the time of the severest whooping (AA) is the lymphocyte curve of a case of hyperleucocytosis. (See Chart III.) This curve reaches a height of 106,000 cells at its peak.

Total white cell counts and absolute counts of the lymphocytes and polymorphonuclears have been made. In the graphs the abscissa represents days and the ordinate the number of cells.

In an analysis of our counts it became apparent that the day of onset of cough was a very indefinite point from which to start the graph. On the other hand the duration of the rise of lymphocytes appeared

fairly constant. We therefore used the highest lymphocyte rise as the fixed point of each curve and plotted the day of onset on this curve by a cross (X) and the severest whooping by a circle (O) as indicated in Chart I. The first chart represents the lymphocyte curves for ten cases of whooping cough in children eighteen months to seven years. The curves of the total and polymorphonuclear counts were omitted to avoid confusion. Cases having superimposed infections or asthma were excluded and infants under six months of age were not included inasmuch as there is some evidence that the characteristic curve does not appear in the very young. Curve (AA) in Chart I may be counted as an exception. It is shown in its entirety in Chart III. The lower portion of the curve is included in this series because it illustrates very

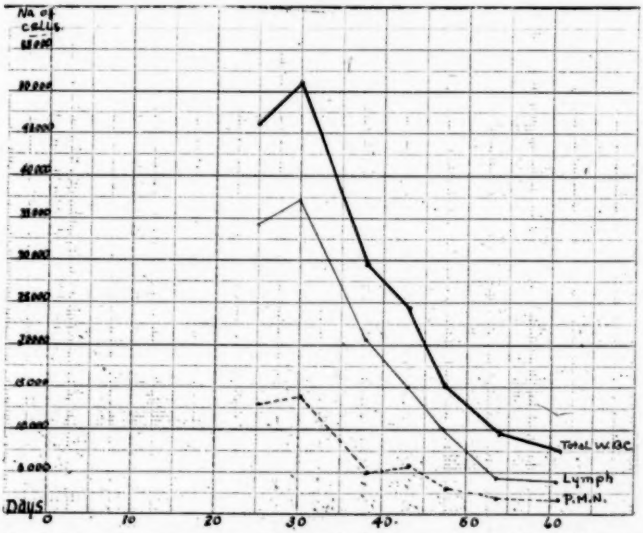

Chart II.—J. S., aged three years. Represents the curve in a moderately severe case of pertussis. Note particularly the polymorphonuclear rise.

graphically the abrupt and tremendous rise of lymphocytes in a case of pertussis with hyperleucocytosis. The lymphocytes reached a height of 106,000 yet the curve fell to normal within the limit of the other curves. It will be discussed more fully later.

No attempt will be made to explain the significance of these curves, but they offer interesting leads for further study. A few things however are apparent. During a period varying from five to fifteen days of cough, the lymphocytes show no change and as a diagnostic aid obviously are of no value. When the lymphocytes begin to increase, they do so rapidly and consistently, so that two or three successive counts with a calculation of the total lymphocytes is diagnostic. The ascent continues for eight or ten days, then falls. The fall is less

abrupt than the rise, taking about eighteen to twenty days to reach normal. The curve reaches a peak and then descends promptly. In none of our cases, even when daily counts were made was there a plateau or irregularity at the highest point of rise. A few cases with an increase to only 15,000 lymphocytes showed a tendency to form a more regular curve in the form of an arc but these did not have daily counts and the peak may have been missed. The severest cough fell quite consistently at the height of the lymphocyte curve. Inasmuch as the histories of the cough were noted at each visit and the graphs not compiled until after the dismissal of patient, suggestion cannot be credited for this consistency. Further studies may find exceptions. In future studies we will note particularly atypical cases and cases occurring in adults and in infants; the influence, if any, of therapy and other procedures on the curve will be investigated and cough plate studies also will be made and plotted on the curve. A study of pathologic cells is in process.

A most interesting manifestation in pertussis is the occasional case with hyperleucocytosis. In a review of the literature 14 cases with leucocyte counts over 100,000 were found, the 2 highest being 233,600.[21] To this list of 14 our hospital series adds 5 more. The condition therefore is probably not so rare as reports in the literature would lead one to conclude. The number of cells makes the smear resemble that of a leucemia. Others have called attention to this and have even suggested a common etiologic basis; however, the differential diagnosis should not be difficult, since the history is distinct, the pathology different and the white blood cells are more nearly normal in contradistinction to the immature cells of leucemia. If any common factor exists between the two diseases, it might be found in an etiological agent of leucemia, chemically related to the toxin of pertussis.

Most of the cases reported with the high counts were complicated with bronchopneumonia, several had convulsions, and the mortality was high: 8 of the 14 patients died. In our series of 5 there was only 1 fatality, one other ran a severe course with death imminent and one ran a moderately mild pneumonia. Two others had very transient high blood counts, but both patients had fever when the count was highest even though no definite chest pathology was demonstrable. A number of theories to explain the leucocytosis and hyperleucocytosis of pertussis have been advanced. That the increase is due to a mechanical extrusion of cells caused by the paroxysm has found a number of supporters. Meunier,[2] made blood counts before and after the whoop and found no great change in the counts. He also found that equally severe paroxysms of nonpertussis origin produced no similar leucocytosis. He agrees with Fröhlich[1] and several others that the toxin of pertussis is probably responsible. Gulland and Goodall[15] call attention to the coincident increase in polymorphonuclears which is definite though not as marked

as the lymphocytic increase and take this as evidence of bone marrow stimulation. Others have noted abnormal white cells which would also support this theory. Our curves (Chart II) confirm a rise in polymorphonuclears which is definite though not as great as the lymphocyte rise. Reiche[16] explained his hyperleucocytosis on the basis of a mixed infection.

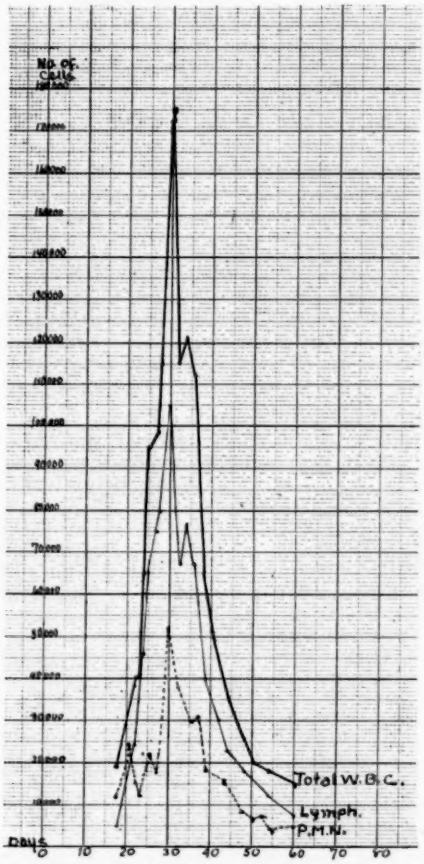

Chart III.—Represents the curves in a case of hyperleucocytosis. This graph is reduced to one-half the size of the other graphs.

From clinical observation and a study of blood pathology the absorption of toxin seems the most logical explanation of both the normal leucocytosis and the hyperleucocytosis of whooping cough. That the pertussis bacillus produces a toxin has been demonstrated by Bordet[17] and more recently by Mishulow[18] and her coworkers. An interesting study by Fukushima[19] showed that injection of pertussis bacilli into

rabbits gave a distinct leucocytosis with a relative lymphocytosis. The lymphocytes moreover showed a marked rise when the lipoid fraction of the bacillus (extracted with ether) was injected. The lipoid free component also caused a leucocytosis but a drop in the lymphocytes. (This reaction may not be specific for the pertussis bacillus.) In whooping cough massive collections of pertussis bacilli are found embedded in the cilia of the respiratory tract. Above the larynx practically none are found, but in the trachea and bronchi the entire epithelium may be covered, and in a case described by Mallory and Horner[20] even the bronchioles were thus affected. In this latter case there was exudate in the lumen and the submucosa was infiltrated with lymphocytes and

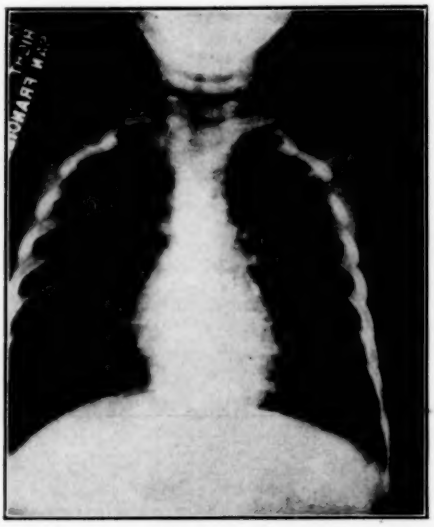

Chart IV.—X-ray of chest of a child with hyperleucocytosis and a clinical diagnosis of pneumonia.

plasma cells. It is possible that in the early stage of pertussis when the pathology is limited to the upper part of the air passages little absorption takes place. As the infection extends lower in the bronchial tree, the toxin is more readily absorbed with a consequent rise in the blood count. If, as happens in a few cases, the infection continues into the bronchioles where absorption of toxin is probably great, it might produce both the extreme hyperleucocytosis and an interstitial pneumonia primarily of pertussis bacillus etiology in contradistinction to the usual pneumonia of whooping cough which is due to a superimposed pyogenic infection.

The blood findings in one of our cases with hyperleucocytosis are given in Chart III and the story of the case follows:

R. S., aged 18 months, was admitted to the hospital with a diagnosis of pertussis. Her general condition previous to the onset of the disease had not been good. She had had a double mastoidectomy some months previously and a tonsillectomy followed by otitis media seven days before entry. On admittance she did not look acutely ill. Her mastoids were well healed, there was slight discharge from the ears which subsided during the pertussis. Her temperature on admittance was 101° F., and her white cell count 18,000. She was in the early stage of the paroxysmal cough. As her whooping cough progressed her blood count rose constantly, on the twelfth day reaching 171,000. Of this count 106,000 were lymphocytes and 65,000

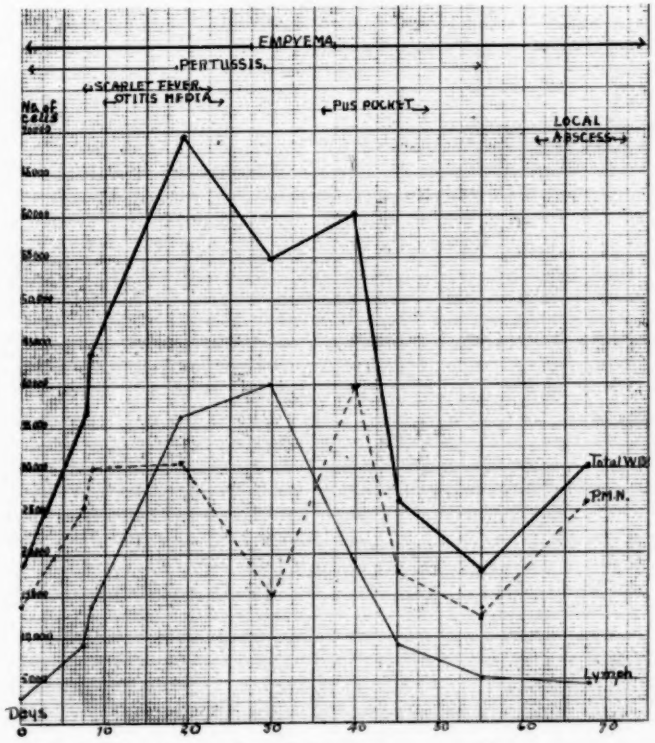

Chart V.—Represents the white blood cell curves in a case of empyema complicated with pertussis, scarlet fever and otitis media. Note the uniformity of the lymphocyte curve and the irregularities of the polymorphonuclear curve.

polymorphonuclears. Her temperature remained around 101° F., reaching 102° F., on one occasion only, her respirations were moderately rapid, she was markedly distressed only during the whoop. Her chest examination revealed diffuse râles with variation in breath sounds and percussion note in different lung areas from day to day. Her ears healed promptly. A diagnosis of bronchopneumonia was made. An x-ray of the chest revealed peribronchial infiltrations (Chart IV).

The child presented the clinical picture of bronchopneumonia, but had a relatively low febrile reaction and an extreme leucocytosis with

proportionate increase in lymphocytes and polymorphonuclears. In other words, the blood curve followed that of ordinary pertussis (Chart I) only reaching higher levels. It was totally dissimilar to the curve of a superimposed pyogenic infection, as seen in Chart V. The x-ray did not confirm a diagnosis of bronchopneumonia. The course of this case is most readily explained by an infection due primarily to the pertussis bacillus. The toxin absorption will also better explain some of the cases elsewhere reported in which fever, convulsions and hyperleucocytosis occurred without definite pathology in the chest.

EFFECT OF OTHER DISEASES ON BLOOD PICTURE

The effect of various diseases on the blood picture of whooping cough has been observed from time to time. Meunier[2] in 1897 described a case of bronchopneumonia developing during the course of whooping cough in which the count had reached 31,600. With the pneumonia the leucocytes dropped to 13,900 and the child was severely ill. One month after resolution the count again rose reaching 26,770 and the paroxysms increased again. He also described 2 cases of otitis media complicating pertussis. Leitner[3] felt that in pertussis with complications in which the prognosis was grave, the white blood count often was lowered, whereas with milder pyogenic infections it was elevated, and he considered that a pertussis count over 30,000 generally indicated some secondary involvement.

Chart V illustrates the blood count in a case of pertussis which occurred during the course of empyema. In this case the pyogenic infection preceded the whooping cough but the course of the pertussis was further complicated by scarlet fever and otitis media. As seen in the chart, the total count reached almost 70,000. It represents the general form of a pertussis curve but rises higher, is more irregular, and continues over a period of about forty days. On closer inspection it will be noted that the lymphocytes follow a typical whooping cough curve, except that it extends over a longer period, and that the irregularities are due to the polymorphonuclears. The first rise in the polymorphonuclears was coincidental with the scarlet fever and otitis media, following which there was a drop in both the total and the polymorphonuclear counts but none in the lymphocytes. Another rise in the polymorphonuclears occurred with the formation of a pus pocket in the pleural cavity, and finally after the subsidence of the pertussis and the completion of the pertussis blood curve still another rise to 30,000 occurred due to an abscess of the soft tissues about the sinus, and with this rise the polymorphonuclears characteristically parallel the total count. This curve is in such contrast to the typical uncomplicated whooping cough curve that the effect of the superimposed pyogenic infection stands out quite vividly.

The occurrence, during the course of whooping cough, of measles or any disease which produces leucopenia should be of interest. Tuscherer[14] has reported on two children who developed measles during the course of whooping cough and he states that in both cases the cough was aborted. He does not mention blood studies. He did not attempt to explain the phenomenon, but points out that one disease may check another and cites as an example malaria in cerebral syphilis. In our hospital series, there were three cases in which measles occurred during the active pertussis. Unfortunately in none of these were blood counts made frequently enough to plot the curves. Two of these cases were sisters of four and six years. Both gave the history of cough of one week's duration before the onset of measles. One child ran a normal measles course. Her blood count on admittance, when the rash was at its height, was 7,000 with 74 per cent polymorphonuclears. The pertussis progressed unabated and on dismissal, 24 days later, her blood count was 38,360 with 59 per cent lymphocytes—an absolute count of 22,630 lymphocytes. Her sister's combined measles and whooping cough was complicated with pneumonia and otitis media. Her blood count on admittance was 10,150 and dropped the following day at the height of the rash to 7,250. A count done on the seventh day after admission, when her temperature was 105°, was 11,200 with 58 per cent polymorphonuclears. The third case, A. G., aged one year, was admitted to the hospital with a cough only, but having a history of exposure to both whooping cough and measles. His count on admission was 12,000 with 66 per cent lymphocytes. Four days later (two days before the rash) it dropped to 7,000 with 58 per cent lymphocytes and six days after admission the measles rash appeared. Thirteen days after admission he whooped and at that time the blood count was 64,000 with 60 per cent lymphocytes—an absolute count of 38,400 lymphocytes. In all of these three the measles with leucopenia may have occurred before the lymphocytes began to increase, but the subsequent course of the pertussis was not altered and the blood counts, judging by these few, rose fairly promptly after recovery from the measles. Recently in private practice, a case of measles occurred in a child with pertussis. There were two boys in the family, aged six and four years; both were in the same stage of pertussis. They had been coughing for five or six weeks and whooping for two weeks when the older boy developed measles. A blood count taken on the day of the measles rash was 3,850 with 66 per cent lymphocytes. His brother's count on the same day was 16,250 with 61 per cent lymphocytes. Four days later, the child with the measles had a count of 10,000 with 61 per cent lymphocytes. These cases suggest that measles occurring during pertussis superimpose a leucopenia on the normal lymphocytosis of the disease.

SUMMARY

1. A graphic representation of the pathology of the blood during pertussis is presented. It shows a fairly characteristic blood phenomenon including an interval of five to fifteen days of coughing without a change in lymphocytes, and then an abrupt rise in these cells which continues for eight or twelve days and falls again, reaching normal after about twenty days. The severest cough occurs at the height of the lymphocyte curve. There is a definite though lesser rise in polymorphonuclears.

2. A case study of hyperleucocytosis is presented and it is suggested that extensive infection into the bronchioles with the pertussis bacilli resulting in increased toxin absorption probably accounts for this type of case, rather than superimposed pyogenic infection.

3. A chart is shown illustrating the constancy of the lymphocyte curves and the fluctuation of the polymorphonuclear curves in combined infections of pertussis bacilli and pyogenic organisms.

4. Measles apparently superimposes a leucopenia on the normal lymphocytosis of pertussis.

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WHOOPING COUGH COMPLICATED WITH INTUSSUSCEPTION

Report of a Case in a Three-Month-Old Infant

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L. S., aged three months, contracted whooping cough early in May, 1932. He did not seem to be particularly ill until May 24, when he passed a stool containing a large amount of fresh blood. He became very fussy and had frequent paroxysms of pain, apparently of a cramp-like nature. All feedings were vomited, although he took them readily. During the next twenty-four hours there was no change in his condition except that the paroxysms of pain were followed by the evacuation of blood from the rectum. No fecal matter was seen by the mother after the first passage of blood on May 24. There was no fever.

The infant was full term and weighed ten pounds at birth. He was the second child. He had been nursed for one week, but had done well on artificial feeding. He was admitted to the Milwaukee Children's Hospital on May 26.

Examination at Time of Admission.—The patient was a well-nourished infant who did not appear to be acutely ill. His temperature was 99° F. per rectum. The examination of the heart and lungs was negative. Nothing abnormal was found in the ears, nose, or throat.

The abdomen was slightly distended but soft. A tumor mass was easily palpated in the right lower quadrant. Rectal examination revealed a low lying mass with the edge of an invaginated area easily palpable. After withdrawing the finger, a considerable amount of fresh blood and mucus was expelled from the rectum. The patient was seen by Dr. Seeger who advised immediate operation. The preoperative diagnosis was whooping cough and intussusception. Two hundred and fifty cubic centimeters of normal saline solution was injected subcutaneously.

Operation.—A large intussusception was found at the ileocecal valve, containing the ileum, cecum, and appendix. In addition there was a small intussusception several feet above the ileocecal valve which was easily reduced. The ileocecal intussusception was reduced with difficulty, and there was so much edema and congestion of the tissues, that it was thought safer to perform an ileocolostomy and a lateral anastomosis. There was a small amount of clear fluid in the abdominal cavity. The infant stood the operative procedure of thirty minutes fairly well.

Postoperative Course.—A second subcutaneous infusion of normal saline was given after the operation. The temperature rose in a few hours to 105° F. but gradually descended to normal after a few days. On May 27, the day after the operation, glucose solution (7 per cent) was given by mouth in small amounts and retained. An enema was given because of abdominal distention and was followed by the expulsion of small amounts of fecal material. On May 30, 140 c.c. of blood was given intravenously.

On May 31 his condition was much improved. He took and retained small amounts of formula. The operative wound was examined and showed a slight infection. His cough, which had almost ceased for a few days after the ether anesthetic, became more severe and frequent, and it was necessary to administer sedatives.

On June 1, the blood count was W.B.C. 12,200; neutrophiles 26 per cent; lymphocytes 74 per cent; R.B.C. 5,470,000; and Hb. 80 per cent.

The urine showed no albumin, sugar, or acetone. The sediment was normal.

There were frequent paroxysms of severe coughing which caused concern because of the operative wound.

On June 3, one week after the operation, the wound broke open and a loop of intestine protruded. Dr. Schaefer replaced the intestine and resutured the wound, using local anesthesia. The infant did not seem much affected by the second operation and continued to take his feedings well.

On June 13, the patient's condition was very good. His cough had become less frequent and not as severe. The temperature had been normal for the past week. Two or three stools were passed daily and there was no vomiting. The edges of the wound were slightly separated due to infection.

On June 17, the sutures were removed, and on June 27, the patient was discharged from the hospital. The wound was healed but there was a moderate abdominal hernia on the right side. The patient had completely recovered from whooping cough. His weight was 12 pounds 14 oz., a gain of 12 ounces since admission to the hospital.

The patient has been well since leaving the hospital. He has gained weight rapidly, and there has been no evidence of intestinal disturbance. The abdominal hernia will probably have to be repaired at a later time.

COMMENT

The noteworthy features in this case report are the association of whooping cough and intussusception in a young infant; the breaking open of the operative incision due to the violent coughing and the uneventful recovery after the second operation. Intussusception is rarely seen at three months and is not mentioned in any textbook as a complication of whooping cough. It is possible that the violent coughing and increased abdominal pressure may have been instrumental in the production of an intussusception in this infant.

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HERPES ZOSTER AND DISSEMINATED VESICLES (VARICELLA?)

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VON BOKAY[1] in 1892 first called attention to the development of varicella following contact with cases of herpes zoster. He believed that there was a causal relationship between the two diseases and has held this view from the time of his original publication to his most recent one in 1928.[2] In spite of the universally infectious nature of varicella and the possibility of accidental coincident infection, many cases on record leave no doubt as to the likelihood of herpes zoster giving rise to varicella at certain times. Numerous articles have appeared in various parts of the world substantiating this viewpoint. In the English literature LeFeuvre[3] was the first to record a case of herpes zoster followed by an outbreak of varicella. Only a few publications have appeared in America, chiefly in dermatological journals. Since the subject is of interest to pediatricians, the literature will be reviewed and a case in which herpes zoster and scattered lesions resembling varicella occurred in the same individual will be reported.

Most of the recorded cases of herpes zoster that have been followed by varicella in contacts, have occurred in adults. The contacts that developed varicella were for the most part children in whom the disease appeared after an interval of from 14 to 20 days. For example:

Hough[4]	Zoster	→	16 days →	Varicella
Riggs[5]	Zoster	→	14 days →	Varicella
Carver[6]	Zoster	↗ →	17 days →	Varicella
		→	19 days →	Varicella
		↘ →	20 days →	Varicella

Barries and Dunderdale[7] reported two cases of varicella that broke out in a ward previously free from infection following one case of herpes zoster. Elliott[8] noted that of 9 occasions when herpes zoster developed in a ward, five were followed by varicella. Marques[9] reported six cases of varicella which appeared almost simultaneously some days after contact with a case of herpes zoster. There had been no varicella in the hospital for two years preceding this outbreak. It is possible, of course, that the chickenpox was brought into these institutions by a carrier. There are other instances, however, in which direct contagion occurred beyond a doubt. Solberg,[10] Bourgin,[11] and Gismondi,[12] for example, reported typical cases in which varicella followed herpes zoster

From the Willard Parker Hospital.

in from 10 to 21 days. Each of these authors stated that at the time of the zoster there were no cases of varicella in the neighborhood. Saulgeot[13] described an epidemic of varicella in Rochefort and the coincidental occurrence there of three cases of zoster. No herpes zoster or varicella occurred in the village for a long time before or after this epidemic. In Pereira's[14] report, a 9-year-old boy developed zoster. Seventeen days later the 5 other children in the family developed varicella. The boy who had zoster, however, did not develop varicella. There are other similar cases recorded in the literature (Guiffré,[15] Panayotatou,[16] Low,[17] Francois-Dainville and Reynaud[18]).

Zoster followed by varicella, as in all of the preceding instances, is recorded as occurring seven times more frequently than varicella followed by zoster (Tezner[19]). The incubation period of varicella, 14 to 21 days, intervened between the appearance of zoster following varicella just as it did between varicella following zoster. For example:

Mayerhofer[20]	Varicella	→	14 days	→	Zoster	→	14 days	→ Varicella
Feer[21]	Varicella	→	14 days	→	Zoster	→	17 days	→ Varicella
						↘	20 days	→ Varicella
Netter[22]	Varicella	→	14 days	→	Zoster	→	14 days	→ Varicella
						↘	14 days	→ Varicella

Pincherle[23] recorded a ward epidemic of varicella which was followed by a case of zoster and again by varicella. Feer thought that zoster was the second generation of varicella appearing in a different form. Alterthum[24] and Mommsen[25] also record cases in which zoster apparently preceded one or more cases of varicella or zoster. It was this type of zoster which von Bokay called Herpes Zoster Varicellosus,[26] believing that the zoster was a mutated form of varicella.

Walther[27] was the first to consider zoster an infectious disease, while Cortelezzi[28] thought it was an infectious disease which regularly preceded varicella. Hill[29] had the same opinion and felt that all cases of herpes zoster should be isolated. It is interesting that although these authors all felt that herpes zoster was an infectious disease and should be isolated, they did not explain the infrequent occurrence of epidemics of zoster. Cole and Kuttner[30] and Cookson,[31] however, recorded small epidemics of zoster. One can therefore say that while zoster occasionally is followed by another case of zoster, it is not as a rule a contagious disease. No one, furthermore, has shown which cases of zoster are contagious or are followed by varicella. Bokay and others have attempted to show that epidemics of zoster and varicella take place during the same years, indicating a relationship between the two diseases. Vital statistics, however, do not show this relationship clearly and Rivers and Eldridge[32] in New York have failed to confirm the European observations. Tezner, however, believed that the increases in

zoster and varicella often occurred simultaneously in institutions and small communities, a fact which could not be ascertained from a study of the vital statistics of a large city or of a nation. Netter,[33] particularly, has been in favor of the idea that varicella and herpes zoster have a common etiological origin, and tabulated 141 cases up to 1924 in which there was a causal relationship between them.

IMMUNOLOGICAL RELATIONS

The recent experimental work on the subject has helped to clarify the relationship of the two diseases. Frei[34] introduced a complement-fixation test using blood serum from cases of zoster and varicella vesicle fluid. Netter and Urbain[35] worked extensively with this test and recorded a positive reaction in over 90 per cent of cases of herpes zoster and varicella. They found the maximum number of antibodies present during the second week of varicella or herpes zoster. They noted that cases of herpes zoster which gave a negative test during the first week of illness later became positive. They believed that the viruses were nearly identical because of the crossed relationship between the zoster vesicle fluid and the varicella serum, or the varicella vesicle fluid and zoster serum. De Lange[36] found the complement-fixation test with both antigens positive in one child with herpes zoster and in two children with varicella, whereas it was negative in two healthy controls and in one case of simple herpes of the tongue. While the complement-fixation reaction, naturally, does not prove that the diseases are interchangeable, it demonstrates that there is a group reaction between the viruses.

In addition the transfer of virus by inoculation has shown that the two diseases are closely related. Lipschutz and Kundratitz[37] inoculated children under five years of age with fluid from zoster lesions. Some of the children developed a local reaction in from 9 to 15 days. Those children who had had varicella could not be successfully inoculated with herpes zoster fluid. Kundratitz[38] reported that 5 of 10 children who were inoculated successfully did not develop chickenpox when directly exposed to the disease. Lauda and Silberstern,[39] however, could not confirm this work. Rivers and Eldridge[40] reminded us that inoculation experiments of the type that Lipschutz and Kundratitz performed are very difficult to repeat because one does not always obtain constant results with a particular virus. They admitted, however, that zoster occasionally might be produced by varicella virus when the skin was irritated, since skin irritation can account for localization of a virus. For example, if a person with herpes labialis scratches his face severely in shaving, the lesion may spread and cause the appearance of a herpes zoster of the facial nerve. Similarly, when the skin is changed by disease as in measles or by local trauma as a Pirquet test, varicella lesions are apt to be prominent around the site of irritation. Animal experimentation, unfortunately, does not clarify the situation. Rivers

and Tillett[41] demonstrated how careful one must be in using animal hosts for the multiplication of a virus. They thought that they were dealing with varicella virus in their studies in rabbits but subsequently discovered that a new virus entirely unrelated to chickenpox normally existed in their experimental animals. Doerr[42] also was unwilling to concede a mutability of virus since the zoster virus, if it exists, is not cultivable and cannot be transmitted so as to produce a disease in any known laboratory animal.

Bruusgaard,[43] however, has recently confirmed Kundratitz' inoculation experiments in a convincing manner. Fresh herpes zoster vesicle fluid was inoculated into the arm of a two-year-old child. Nine days later, vesicles appeared at the site of inoculation. Fluid from these vesicles was then reinoculated into two other small children, one of whom developed a local vesicular reaction. After fourteen days, vesicles in crops appeared on the trunk, face, and scalp accompanied by fever. This rash had the appearance of varicella. Fourteen days later, the patient's brother, in the adjoining bed, developed varicella. There were no visitors allowed in the ward nor was there any varicella in the hospital at the time. These experiments were repeated on several occasions and apparently demonstrate that zoster vesicle fluid causes varicella after human transfer.

Thus far the clinical and experimental evidence cited justifies the belief that herpes zoster and varicella are closely related. There are, however, numerous clinical observations which do not fortify this viewpoint. Cantor[44] reported that many cases of zoster occurred on Christmas Island in the Straits Settlements. This island was uninhabited before 1888 and varicella had been unknown since it was populated. Bokay,[45] commenting upon Cantor's observations, felt that it was likely that the type of zoster seen on Christmas Island was not infectious. Dietl[46] showed that varicella does not produce an immunity against a subsequent attack of zoster. He cited two instances of zoster in children who previously had had varicella. Barabas[47] reported two cases of zoster both of whom developed varicella 8 and 9 months later. Each of Cookson's four cases of zoster in adults had had varicella in childhood. One of Cookson's patients, aged 58 years, had likewise previously had zoster, a confirmation of Lesné and de Gennes'[48] statement that an attack of herpes zoster does not always confer permanent immunity. These authors also felt that the two diseases were different because of the fact that zoster affects adults chiefly whereas varicella is a disease of childhood. Roxburgh,[49] in an excellent article, called attention to the fact that herpes labialis, herpes zoster, and varicella were not the same because they differed in their immunological reactions. Inasmuch as encephalitis does not follow zoster, Perdrau[50] thought that it was not caused by the herpes virus, but possibly by its dermotropic strain. Roxburgh thought that under some circumstances varicella virus caused a

zoster-form type of eruption due to some local damage to the ganglia posteriora and nerve roots. He cited the cases of herpes zoster which occurred following injections of salvarsan during treatment for syphilis as an example of a virus attacking a tissue damaged by arsenic. Netter and Urbain believed that arsenic stimulated a dormant virus and caused it to produce an eruption. Alterthum had seven cases of zoster following arsenic injections in patients with cerebrospinal lues. He felt that some of these cases were of varicellous origin because a few of the cases of arsenic zoster were associated with an outbreak of varicella. He showed, however, that children with zoster did not develop an immunity to varicella, for, when exposed, they contracted the disease. Rivers and Eldridge, on the other hand, explained the cases of arsenic zoster as zoster localized at the site of tissue irritation similar to the localization of vesicles in chickenpox around the site of irritated skin, as in the Pirquet test. They felt that in the presence of a varicella epidemic, cases treated with arsenic might develop zoster, but they thought it not unlikely that arsenic caused actual nerve injury with resultant localization of the zoster virus in injured tissues.

In spite of the difficulty of experimentally demonstrating the relationship between varicella and some cases of zoster, one cannot agree with Comby[51] that it is purely accidental.

The coexistence of lesions characteristic of both varicella and zoster in the same patient, another phase in the close association of the two diseases, is illustrated by the following case, which forms the basis for this report.

CASE HISTORY

H. G., male, aged forty-two years, had always been well except for measles in infancy. He had not had varicella. On February 19, 1932, he suddenly complained of severe pain in the lumbar portion of his spine. Two days after the onset of the pain, he noted that the skin of the right lower quadrant of his abdomen was reddened and covered with small blisters. The following day he observed the appearance of some red spots, some of which were vesicular, scattered over his face, back, chest, arms and legs. His temperature was 101° F. He was admitted to the Varicella Ward at the Willard Parker Hospital on February 22, 1932. In addition to the lesions described, a few vesicles were noted on the scalp, but none were seen on the oral mucous membrane. The lesions on the lower back and abdomen followed the course of the second and third lumbar nerves and were sharply limited to the right half of the body (Fig. 1). They were accompanied by severe pain which lasted two weeks. The vesicles which were scattered over the body seemed to dry and crust at about the same time. The crusts were slightly umbilicated. No further crops of vesicles appeared. Desquamation and healing of the zoster lesions was not complete for three weeks.

The leucocyte count on admission was 7,050; 61 per cent polynuclears, 33 per cent lymphocytes, and 6 per cent monocytes. A lumbar puncture revealed clear fluid under normal pressure containing 15 cells per cu. mm., all lymphocytes. Except for the discomfort caused by the zoster, the patient did not appear very ill and was afebrile after the first day in the hospital.

When this patient was admitted to the hospital, a diagnosis of coexistent herpes zoster and varicella seemed justifiable. The lesions on the lower portion of the back and abdomen were typical of zoster. The lesions scattered over the rest of the body resembled those of a typical case of varicella. Either lesion if seen separately in two individuals, would have been called zoster in one instance and varicella in the other.

The patient's age, forty-two years, militated somewhat against the diagnosis of varicella, although the patient had not had the disease previously. The patient was a janitor and superintendent in an apart-

Fig. 1.

ment house in which a number of children lived. A careful survey of all the tenants in the house showed that not a single case of varicella had occurred in the four weeks preceding or following the patient's illness. His nine-year-old child did not contract the disease. The blood count, while not of definite significance, showed a tendency to a leucopenia and monocytosis which are usually present in varicella. A slight increase in the number of cells present in the spinal fluid, on the other hand, frequently occurs in zoster but usually not in varicella. The vesicles went through the typical stages of drying and crusting. The slight umbilication which appeared during healing could occur in either

varicellous or herpetic lesions. There was, however, only one crop of vesicles, whereas in ordinary varicella fresh vesicles usually appear for a few days after the onset. The zoster, was, moreover, the more striking of the two sets of lesions which the patient presented.

How then was this case to be classified and how were its manifestations explicable? The literature contains numerous reports of cases in which both herpetic and varicelloid lesions occurred in the same patient. In some of the cases on record the onset of the two sets of lesions was simultaneous. In others the zoster appeared first, followed by discreet vesicles in from one to sixteen days.[2] Aviragnet, Huber and Dayras[52] record the only instance in which the varicella lesions preceded the zosterform eruption. In by far the greatest number of cases with coexisting lesions, the patient was an adult male, usually over thirty years of age and often described as thin and poorly nourished. McEwen,[53] Roxburgh and Martin,[54] McCormick,[55] Goldberg and Francis,[56] Cleveland,[57] Parounagian and Goodman,[58] Corlett,[59] Shelmire and Shelmire,[60] Troisier and Delalande,[61] Leri,[62] Grant,[63] Seymour[64] and Bruijning,[65] reported such cases. Cases of combined lesions are more numerous in adults than in children since zoster occurs more frequently in adults. Instances in children have been described by Ker,[66] de Woolfson and Smith,[67] Morley,[68] Mommsen,[25] Scheer[69] (in one of his own children), Frei,[34] Stein,[70] Willcox and Rolleston,[71] Gautier and Peyrot,[72] and Aviragnet, Huber and Dayras.[52] Netter[73] tabulated 9 instances of coexisting "varicella and herpes zoster," and Bokay[2] could find only 29 cases including Netter's and some of those mentioned above. In most of the instances with coexistent lesions, the zoster lesions predominated. Frei, for example, stated that in her case there were only a few vesicles scattered over the body apart from the main zoster lesion. Tenneson[74] first called attention to the fact that in many cases of herpes zoster, there were aberrant lesions, a fact well known previously to dermatologists. He stated that these vesicles were not as persistent or as characteristic as the herpetic eruption of the zoster itself. Schonfeld,[75] however, found aberrant vesicles infrequently. The type of case which Tenneson described was reviewed by Parounagian and Goodman but these authors did not discuss the connection between their case and varicella.

The differentiation between the two types of cases with mixed lesions depends upon

1. A previous history of varicella.
2. The character of the lesions whether chiefly varicellous or zosterform.
3. Subsequent varicella in a contact.

Varicella did not follow exposure to the patient reported in this paper so that we cannot conclude that this was a true case of herpes zoster

and varicella. The fact that he was removed from his home might have prevented the contagion.

It is not always possible to differentiate cases of herpes zoster with aberrant vesicles from cases of herpes zoster with true varicella. In the event that varicella follows exposure to one of these cases, one can correctly assume that the scattered lesions were varicellous. McEwen, Cleveland, Shelmire and Shelmire, Roxburgh and Martin, Morley, Leri, Frei, Stein, and Mommsen recorded instances in which varicella followed contact with a case of herpes zoster and disseminated vesicles. Furthermore, in each case the onset of varicella occurred about fourteen days after exposure, the usual incubation period of that disease, which definitely excludes accidental infection from an unknown source. It would appear then that the cases having both herpes zoster and vesicles scattered over the body are potentially infectious. One cannot, however, say that all such cases are contagious, for no doubt there are many instances of herpes zoster with disseminated vesicles, such as the case described in this paper, which are not followed by varicella. From the universally infectious nature of that disease one would expect contagion in most cases in which the vesicles contained the varicella virus. That the fluid from the disseminated vesicles in McCormick's fatal case probably contained varicella virus is apparent from the fact that McCormick was able to protect an eighteen-month-old infant who was exposed to varicella by inoculation with vesicle fluid. Similarly, Bruusgaard using vesicle fluid from a case of herpes zoster with aberrant vesicles, produced a local reaction in three infants, one of whom subsequently developed a rash which clinically resembled varicella. Sixteen days later a child in the adjoining bed who had not been inoculated developed typical varicella. In other words, vesicle fluid from a case of herpes zoster with aberrant lesions caused varicella in an inoculated infant and also in a child who had been in contact with the latter.

Several additional points may be cited as an aid in differentiating clinically the cases of herpes zoster with aberrant lesions from herpes zoster with varicella. When only a few aberrant vesicles are present, it is unlikely that they are varicellous because of their paucity and lack of distribution characteristic of varicella. An earlier history of varicella is another aid. A case showing herpes zoster and vesicles scattered over the body would in all likelihood not be a case of coexistent herpes zoster and varicella if the patient previously had varicella. Second attacks of varicella are so rare that one could justifiably assume that the disseminated vesicles from a patient who previously had varicella did not contain varicella virus. As a matter of fact this assumption is borne out by the recorded histories of the cases of herpes zoster with varicella, none of whom had previously had varicella. Just why infection with herpes zoster should not remain localized in an individual not immune to varicella is not readily understandable, unless

one assumes the existence of a close relationship between the two viruses, similar to Bokay's cases of herpes zoster varicellosus.

COMMENT

I believe that cases of the latter type develop by dissemination of the virus which first attacks one or two posterior nerve roots and later spreads through the body because of an absent systemic immunity against varicella. The clinical facts furthermore coincide with this theory inasmuch as when two types of lesions occur coincidentally, the zoster always appears first, the scattered vesicles or varicella later. This latter fact would seem to contravert the opinions of Comby and Rolleston who feel that because varicella is so ubiquitous the two diseases might occasionally occur simultaneously in the same individual. Were this true one ought to find as many cases in which varicella vesicles precede zoster as those in which zoster precedes varicella when the diseases coexist. As previously stated, both lesions occur simultaneously or zoster appears first and scattered vesicles follow.

In conclusion it may be well to summarize the points which seem to indicate a relationship between the two diseases. Considering them each separately we may say that they are both virus diseases characterized by vesicles. The immunity in each disease is usually permanent although second attacks of both zoster and varicella have been recorded.

There are, however, many clinical points in which they differ. The herpes vesicles are localized; those of varicella are diffuse. Herpes is painful whereas varicella is not accompanied by pain. Varicella is very contagious whereas herpes zoster is usually not. The former occurs chiefly in children, the latter chiefly in adults. Cerebral complications may occur following varicella; they are practically unknown following herpes zoster. Fever is far more common in varicella than in herpes zoster. On the other hand, recent evidence indicates more and more that while herpes usually is not contagious, cases of apparent contagion are increasing in number. The inoculation experiments of Kundratitz recently confirmed by Bruusgaard lend support to the view that the viruses are closely related. The cases in which varicella and herpes zoster coexist seem to indicate a definite clinical relationship between these diseases.

We know that fever blisters are caused by herpes simplex virus and that varicella is caused by varicella virus. We do not, however, know whether a definite herpes zoster virus exists. Some cases that are clinically described as herpes zoster are undoubtedly due to herpes simplex virus for the clinical picture of herpes zoster can be produced by skin irritation at the site of infection with herpes simplex virus. Similarly varicella virus can cause a clinical picture indistinguishable from zoster. Many of the cases recorded from the literature of supposed transmission of herpes zoster to varicella are probably cases of varicella and

their transmissability after fourteen to twenty days strongly suggests the normal incubation period of varicella. Herpes simplex and varicella viruses therefore probably account for some of the cases of herpes zoster. We must assume that there is a specific herpes zoster virus as yet undiscovered which causes the remaining cases of zoster. The answer to the question, naturally, lies in the isolation of this hitherto unknown zoster virus. The fact that the three diseases, namely, simple herpes, herpes zoster, and varicella usually breed true to type, indicates that for the most part they are caused by separate viruses.

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X-RAY TREATMENT OF SOME INFLAMMATORY CONDITIONS IN CHILDHOOD

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THE value of x-ray therapy in the treatment of inflammatory conditions in pediatric practice is not so well known as it deserves to be. Its use has been confined chiefly to the treatment of enlarged thymus glands, whooping cough and occasionally eczema and asthma.

In 1906 Coyle first demonstrated the value of x-ray therapy in the treatment of carbuncles. Since then there has accumulated an imposing mass of evidence indicating the great value of radiotherapy in many other pyogenic and nonpyogenic infections. This literature has been compiled by Desjardins. Despite this accumulation of favorable evidence there has not been a very rapid acceptance of the value of radiotherapy by most clinicians. It is certainly not as widely known as it should be. The reason for this has been perhaps the difficulty in explaining the action of x-rays and the fear of possible danger from them.

The list of conditions in which favorable results have been reported includes whooping cough and asthma which are well known; pneumonia and unresolved pneumonia, acute lymphadenitis, parotitis, otitis media and mastoiditis, cellulitis, erysipelas, and pyogenic skin infections. Favorable reports have also appeared in the treatment of such desperate conditions as septicemia and peritonitis.

It is perhaps the multiplicity of diseases as well as the lack of adequate explanation of its action that has led many physicians to discredit the clinical evidence, or to ascribe these favorable reports to overenthusiasm for this form of treatment.

One of the most widely accepted explanations of the action of x-rays is that they produce a disintegration of lymphocytes. These cells are very sensitive to the effect of x-rays and with doses so small that other cells are unaffected, will undergo disintegration with consequent liberation of enzymes which combat the infection. Whatever the explanation may be, Desjardins states that with doses as small as those used in this type of treatment no possible damage can result, even if no benefit is derived.

From the Detriot Polyclinic.
Read before The University of Michigan Pediatric and Infectious Disease Society, Ann Arbor, November, 1931.

The purpose of this paper is to report some of the results obtained with radiotherapy in inflammatory conditions in children. No technical details as to dosage will be given because this matter should remain in the hands of competent therapeutic radiologists.

ACUTE LYMPHADENITIS

Acute glandular swellings, secondary to infections of the upper respiratory tract, occur very frequently in children in this locality. These glandular infections often persist for many days and even weeks after the primary disease has subsided. The general course of acute glandular infections has been truly said to be one of weeks rather than days, characterized by persistence of temperature and occasionally migration of the infection from one gland to another. Most of these cases finally subside, a few progressing to suppuration requiring incision and drainage. X-ray therapy in these cases has been amply demonstrated to shorten the duration of the inflammatory process either by accelerating resolution in most cases, or as occurs in a few instances, by hastening suppuration. The result in the majority of cases has been a rapid subsidence of pain, temperature and swelling, following each exposure to the x-rays. No harmful effects have been demonstrated by the use of x-rays at four to five day intervals. Rosenberg who reports eighty consecutive cases of acute cervical adenitis in children treated in this manner, concludes that "Roentgen therapy for acute cervical adenitis is the most successful treatment for this condition. The earlier the treatment is given the better are the results."

I have advised x-ray therapy in twenty-one cases of severe, acute lymphadenitis. The beneficial results have been most striking. From one to three treatments generally sufficed. In only three cases did subsequent suppuration occur. In almost all cases the duration of the inflammatory process seemed definitely shortened. The following cases illustrate striking results, which sometimes follow a single treatment.

CASE 1.—L. G., aged three years. Had an acute sore throat with temperature of 101° F. for twelve hours. That evening a sudden rise in temperature to 105° occurred with the development of a large swollen gland in the neck about the size of a hen's egg. Physical examination aside from the sore throat and gland was entirely negative. The urine was negative. X-ray treatment was advised and given that evening. No other treatment was given. The child's temperature dropped to 100° in three hours and was normal in the morning. The gland receded overnight to the size of a small bean. There was no recurrence.

CASE 2.—A. C., aged five years. During the winter of 1928 developed temperature of 102°, and generalized aches and pains which seemed very much like many other cases of grippe prevalent at that time. On the second day of his illness he developed an axillary adenitis about the size of a small orange. One x-ray treatment was given. The gland disappeared almost completely in forty-eight hours, at which time the temperature became normal.

ACUTE HILUS LYMPHADENITIS

Infection of the hilus glands, following influenzal and respiratory infections, occurs fairly frequently. These cases are characterized by persistent temperature, unexplained by clinical and laboratory findings. In three cases of this nature enlarged hilus glands were demonstrated by x-ray films. In two of these cases the temperature subsided within twenty-four hours after one roentgen irradiation. In the other case two irradiations were necessary. The following case illustrates the rapid resolution of an enlarged hilus gland following one treatment.

CASE 3.—M. A., aged seven years. This child when first seen had been ill for two weeks with temperature ranging from 101° and 103°. His illness had begun with a sore throat which had apparently cleared up in a few days, despite which the temperature persisted. Physical examination was negative, as was the urine and Von Pirquet. The white count was 18,000 with 64 per cent polys. An x-ray picture of the chest showed a large gland at the hilus about the size of a half dollar. Twenty-four hours after one x-ray treatment, the temperature had returned to normal. A chest film made one week later showed that the gland was greatly reduced in size.

It should be emphasized that not all hilus shadows should be treated with x-ray. Cases of acute flare-up of tuberculous infection have followed the irradiation of the chest with x-ray. A positive tuberculin test is a distinct contraindication to this type of therapy.

ACUTE OTITIS MEDIA AND MASTOIDITIS

Mastoidectomy in infancy and childhood is a serious major operation. Any procedure that will lessen the necessity for surgical intervention should be considered. It is the rule rather than the exception that most cases of acute otitis media develop a mild mastoiditis. In some of these cases there are persistent pain and temperature, and often tenderness over the mastoid process. This degree of mastoid involvment may clear up spontaneously or progress to bone involvement requiring mastoidectomy. It is in this early type of mastoiditis before osteomyelitis of the mastoid bone has occurred that x-ray therapy is of great value. Most otologists agree that few cases of mastoiditis are surgical emergencies. It is during the period of observation by both otologist and pediatrician, when the decision for surgical intervention is being considered, that x-ray therapy should be given a trial. No time is being lost and the patient may be given an opportunity to escape a serious surgical experience. It is not advocated that typical mastoiditis be treated in this fashion, or that any delay ensue because of this method of therapy, that might endanger the child. But it is urged that x-ray therapy be given a trial during the early stages of mastoiditis under careful observation by the otolo-

gist and pediatrician. There is no evidence that x-ray treatment, properly given, has any deleterious effect. The accumulated clinical data from many sources seem to indicate that the beneficial effect of the x-ray is apparent after one or two treatments. Those cases in which this type of treatment will be effective generally show a rapid response, sometimes within twenty-four hours. Such was usually true in this series of cases.

In a series of 169 cases of acute otitis media seen during the last five years in which clinical care could be continuous, twenty-nine developed symptoms suggestive of mastoiditis. These cases were characterized by persistent pain and temperature, and in some tenderness over the mastoid process, despite repeated and ample paracentesis. X-ray therapy was applied to this group. From one to three irradiations caused a complete subsidence of symptoms except in two cases which eventually required bilateral mastoidectomy.

The question is always open to discussion as to whether the beneficial results obtained with x-rays have been due to their specific effect or have been due to the natural tendency of many cases of mastoiditis to get well if given sufficient time. The following cases are fairly typical of the result of roentgen therapy in this series.

CASE 4.—A. H., aged two years. Developed bilateral otitis media in the winter of 1928 requiring paracentesis. The temperature fluctuated between 100° F. and 104° F. for two weeks. Paracentesis was repeated on six occasions following which the temperature would remain normal for only twenty-four hours. During the periods of high temperature the child was fretful, apparently in pain and unable to sleep. The otologist advised bilateral mastoidectomy but consented to one treatment of x-ray and a twenty-four hour delay in operation. Twelve hours after x-ray therapy the temperature was normal. There was apparently no pain. The ears discharged approximately the same as before. Ten days later the discharge ceased completely. No further attacks occurred.

CASE 5.—E. C., aged three years. Earache and temperature of two days' duration. A left paracentesis was performed. Three days later the child still complained of severe pain, especially behind the ear. The temperature fluctuated between 100° F. and 103° F. The tip of the left mastoid was tender. There was no edema. The left ear was discharging freely. There was marked pulsation of the ear drum, despite a fairly wide opening. The x-ray film showed cloudiness of the left mastoid antrum. In the meantime a wide incision of the ear drum was made from the attic to the floor of the canal. The following morning the temperature was normal. There was no further pain or tenderness. The following day the original symptoms recurred. The mastoid was again tender. The ear drum was again pulsating and there was a temperature of 104°. X-ray therapy was then suggested to the otologist who in this case also consented to a twenty-four hour delay in operation. The following day all symptoms had subsided. Recovery from this point was uneventful. The ear was dry in fourteen days.

CASE 6.—C. F., six-year-old male child. Developed bilateral otitis media requiring paracentesis. Despite profuse drainage of pus from both ears, the temperature fluctuated between 100° and 104° for four days. There was considerable pain, and some tenderness over both mastoid antra. The child was unable to sleep

for more than a few hours at a time. X-ray films showed cloudiness of both mastoid antra. On the fourth day both sides were treated with x-ray. The temperature for the next five days fluctuated between 100° and 102°. There was an increase in the discharge from both ears and considerably less pain and tenderness over mastoids. On the ninth day x-ray therapy was again applied to both mastoid regions. The temperature dropped to normal the following day and remained normal. The ears continued to discharge as before. On the twentieth day the ears were still discharging but considerably less than before. A third x-ray treatment was applied. The ears were dry a few days later. One year later there had been no recurrence.

The two cases of mastoiditis, treated with x-ray, which eventually required bilateral mastoidectomy, received three and four irradiations respectively. Fever, pain and aural discharge continued, with only slight remissions after some of the treatments. There was considerable persistent tenderness but no edema over the mastoids. At operation, in each case considerable destruction of the mastoid cells on both sides was found.

CHRONIC OTITIS MEDIA

The results in chronic otitis media have not been so striking as in some of the acute inflammatory conditions. It was tried in six cases in which a purulent aural discharge had persisted for many months, despite adequate removal of tonsils and adenoids and other types of therapy. In two of these cases the discharge cleared up in two and five treatments with the x-ray, respectively. The other cases were not benefited.

ACUTE EPIDEMIC PAROTITIS

The results obtained in mumps have been very gratifying. The use of x-ray therapy was advised in cases in which the symptoms were very acute, with much pain, fever and marked constitutional symptoms. Usually one treatment caused a complete subsidence of symptoms within twenty-four hours. The majority of the cases do not require such treatment.

SUMMARY

Roentgen irradiation has been found to be a valuable form of therapy in many acute inflammatory conditions in children. No deleterious effect from x-ray treatment has been reported in the literature in cases of this type, when the proper technic and correct doses have been used. It is necessary to emphasize that the value of the x-rays is greater when used early in the disease, and that the treatment should be given by a competent therapeutic radiologist.

In my experience this form of treatment was especially satisfactory in acute lymphadenitis and early mastoiditis. The use of roentgen therapy of inflammatory conditions in childhood is deserving of greater and more widespread trial.

The author wishes to thank Dr. T. B. Cooley for his kind assistance in the preparation of this paper.

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VARIATIONS IN THE REACTION TO THE SCHICK TEST

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AFTER reading several thousand Schick tests performed a year ago in connection with the entrance physical examinations of students at the University of Minnesota, I gained the impression that the more severe reactions were occurring in students whose skins were markedly pigmented. A priori the opposite of this would have seemed the more probable because it is usually assumed that sun-tanned skin is less susceptible to irritation and bacterial toxins than is the normal skin. In fact, in 1931 Sorrentino[1] reported that he obtained diminished Schick reactions in those persons who had had heavy doses of ultraviolet radiation.

In order to confirm or disprove this impression it was decided to make careful records of the degrees of pigmentation and the severity of the reactions to the Schick test in the students who were given physical examinations in September, 1932; 2098 students were Schick tested at this time. These tests were read one week after application, eight physicians taking part in the readings at various hours of the day. The degree of pigmentation of the skin was judged by the examiner and designated as grade 1, little or no pigmentation; grade 2, moderate pigmentation; grade 3, extreme pigmentation. The positive Schick tests were designated as +, ++, +++, ++++; + indicating slight redness and induration; ++++ indicating superficial necrosis of the skin

TABLE I

RESULT OF SCHICK TEST	LITTLE OR NO PIGMENTATION PER CENT	MODERATE PIGMENTATION PER CENT	EXTREME PIGMENTATION PER CENT
Negative	42.40	45.57	40.05
1 plus (+)	16.80	17.71	9.70
2 plus (++)	19.40	18.80	10.71
3 plus (+++)	10.90	10.62	12.50
4 plus (++++)	10.50	7.30	27.04

TABLE II

RESULT OF SCHICK TEST	LITTLE OR NO PIGMENTATION PER CENT	MODERATE PIGMENTATION PER CENT	EXTREME PIGMENTATION PER CENT
Negative	42.40	45.57	40.05
+ and ++	36.20	36.51	20.41
+++ and ++++	21.40	17.92	39.54

From the Student's Health Service, University of Minnesota, Minneapolis.

or bleb formation; and ++ and +++ indicating reactions intermediate between these two extremes.

The results, just as they were tabulated, are shown in Table I, and, as they appear when a smaller number of groupings is used, in Table II.

From these tables, it would appear that severe reactions occur with greater frequency in those cases of marked pigmentation, and that milder reactions were found in the cases of slight pigmentation.

For the purpose of studying this question further, the following technic was employed. Ten Schick positive individuals were tanned on the dorsum of one-half the forearm with ultraviolet radiation, the other half of the forearm being protected from the rays. In some individuals the tanning was on the radial side, in others, on the ulnar side. After the skin showed distinct pigmentation, Schick tests were applied both in the tanned areas and in the areas which had been protected from the ultraviolet rays. One of these persons did not return for a reading of the test, but of the nine whose Schick tests were read, eight showed a more severe reaction in the tanned area and one showed a more severe reaction in the pale area. Ten other persons who were tested simultaneously on the radial and ulnar sides of the forearm, without tanning, showed identical reactions in both areas.

The reason for this difference in the reactivity of the tanned and untanned skin to diphtheria toxin is not clear, but some such factor may tend to account for at least some of the variability in the Schick test which has been reported by Kellogg and others, and from time to time has tended to make some writers question the reliability of the test.

CONCLUSIONS

1. The severity of the skin reaction to diphtheria toxin in susceptible individuals is apparently influenced by the pigmentation of the skin produced by sunlight or ultraviolet light.

2. The more severe reactions tend to occur in those individuals whose skins show extreme degrees of pigmentation.

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THE AGE INCIDENCE AND CLIMATIC VARIATIONS IN THE MANIFESTATIONS OF SO-CALLED RHEUMATIC FEVER IN WHITE CHILDREN

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THE clinical manifestations and complications of rheumatic fever in adults are apparently influenced by climatic conditions and geographic locations. Statistics[1, 2, 3] indicate that the disease is more common and the symptoms more severe in the colder parts of the temperate zones than in the warmer parts. Rheumatic fever and rheumatic heart disease are about half as common in Virginia as in Massachusetts.[4] From available statistics from Louisiana and Georgia the disease is apparently rare in those localities. In China mitral stenosis is common but rheumatic arthrisis is rare.[5] Clark[6] and Coburn[7] believe that rheumatic fever is extremely uncommon in the tropics; but rheumatic carditis is not unknown.

Longcope[8] found that in adults in Baltimore, "The severe arthritis so familiar in New York was rarely encountered, and that rheumatic fever was essentially rheumatic carditis, often of insidious onset with comparatively mild acute exacerbations, but progressing none the less to a chronic deforming endocarditis with involvement of the myocardium and often of the pericardium and resulting eventually in chronic invalidism and death." In conclusion he states, "The disease is comparatively common in Baltimore; in the adult wards of Johns Hopkins Hospital the admission rate of rheumatic fever in all its forms and stages over a five year period was 1.37 per cent. The autopsy rate for rheumatic heart disease over a twenty-one year period was 1.66 per cent." He intimates that rheumatic fever might be detected more frequently in the southern states and in semi-tropical countries if the disease was regarded as one primarily of the heart.

The following is an analysis of case records of white children with rheumatic fever admitted to the Children's Hospital in Birmingham, Alabama. The investigation was undertaken in an endeavor: 1. To collect statistics on the incidence of the disease in the various age groups. 2. To obtain further information about the clinical manifestations of the disease in this particular locality.[9, 10] 3. To show that the sequelae and varied manifestations of rheumatic fever are more prevalent in certain parts of the south than is generally recognized.

From the Children's Hospital, Birmingham, Alabama.

For uniformity, and to assist in obtaining information regarding the regional distribution of the disease in children, an attempt has been made to use as much as possible the method of analyzing case records used by Longcope of Baltimore. Rheumatic fever being considered as by Longcope, "A generalized disease including: chorea, mitral stenosis, rheumatic pancarditis and rheumatic arthritis, whether observed in the active, quiescent or possible healed stages of the disease."

TABLE I

ADMISSION OF RHEUMATIC FEVER PATIENTS, WHITE CHILDREN, OF ALL AGES TO THE CHILDREN'S HOSPITAL, BIRMINGHAM, FROM JANUARY 1, 1922, TO JULY 1, 1932

Total Admission	6,798	patients
Rheumatic Fever	122	cases
Admission Rate	1.79	per cent

From January, 1922, to July, 1932, of 6,798 white children of all ages admitted to the Children's Hospital, a diagnosis of rheumatic fever was made in 122, or 1.79 per cent of the total admissions. (Table I.) Of the 122 patients 52 were boys and 70 girls.

The chief complaint on admission was as follows:

1. Cardiac Disease	48 cases
2. Admission for Tonsillectomy and Adenoidectomy	26 cases
3. Arthritis	17 cases
4. Chorea	16 cases
5. Miscellaneous	15 cases

In 32 patients in whom a diagnosis of rheumatic fever was made the case records gave no previous history. Of this number 26 were admitted for tonsillectomy and adenoidectomy. In each case the attending pediatrician made a diagnosis of rheumatic heart disease. From the records the majority were in rather an advanced stage, and in all probability the heart condition had been recognized in the patients.

Of 90 children in whom the records were complete 48, or 53 per cent, gave a history of cardiac disease; 29, or 32 per cent, arthritis; 16, or 18 per cent, chorea; 55, or 61 per cent, tonsillitis; 7, or 7.7 per cent, scarlet fever.

On admission to the hospital a diagnosis of cardiac disease was made in 102, or 83.6 per cent, of the 122 rheumatic fever patients; arthritis in 24, or 19.6 per cent; chorea in 19, or 15.5 per cent; pericarditis in 5, or 4 per cent. (Table II.)

Of the 102 cases with cardiac disease 79 had cardiac disease alone; 12 cardiac disease with arthritis; 11 cardiac disease with chorea. Of the 24 arthritis cases 12 had arthritis alone, 12 arthritis with cardiac disease. Of the 19 chorea cases 13 were girls and 6 were boys; 8 had chorea alone; 11 chorea with cardiac involvement.

TABLE II

THE PHYSICAL FINDINGS IN 122 CASES OF RHEUMATIC FEVER IN WHITE CHILDREN, ON ADMISSION TO THE CHILDREN'S HOSPITAL, BIRMINGHAM, ALABAMA, WITH GROUPINGS ACCORDING TO AGE IN YEARS

AGE IN YEARS	NO. PATIENTS	TONSILS		TEETH EXTRACTION OR DENTAL WORK RECOMMENDED	ARTHRITIS ALONE	CHOREA ALONE	CARDIAC DISEASE			HYPERTROPHY OF HEART	DECOMPENSATION	PERICARDITIS	DEATH
		ABSENT	PRESENT				ALONE	WITH ARTHRITIS	WITH CHOREA				
3	9	2	7		1		6	2		4	1		
4	9	1	8	2			8			6	1	1	2
5	18	5	13	1	1	1	12	2	1	9	4		1
6	12	2	10	6		1	10	2		7	2		
7	14	3	11	7	3		6	1	4	6	1		
8	20	3	17	6	3	2	10	3	2	8	2	1	2
9	9	3	6	3		1	5	1	3	5	3		1
10	14	5	9	1	2	1	10		1	7	2		
11	12	3	9	4	1	1	10			7	3	2	2
12	5	3	2		1	1	2	1		3	3	1	3
Total	122	30	92	30	12	8	79	12	11	62	24	5	11

There was definite hypertrophy of the heart in 62, or 60.8 per cent, of the 102 cardiac patients; decompensation in 24, or 23.5 per cent. The mortality in the hospital was 11, or 10.8 per cent.

Of the 122 rheumatic fever patients 30, or 24.6 per cent, had the tonsils and adenoids removed before admission to the hospital; in 92, or 75.4 per cent, the tonsils and adenoids had not been removed. The attending pediatrician recommended dental attention or extraction of teeth in 30, or 24.6 per cent, of the rheumatic fever patients. Of the 19 choreic patients dental extraction was recommended in 37 per cent; of the 103 nonchoreic patients dental attention or extraction was recommended in 22 per cent.

TABLE III

THE AGE AND SEX INCIDENCE OF 122 WHITE CHILDREN ADMITTED TO THE CHILDREN'S HOSPITAL, BIRMINGHAM, ALABAMA, WITH DIAGNOSIS OF RHEUMATIC FEVER

AGE IN YEARS	SEX		RHEUMATIC FEVER CASES	TOTAL ADMISSIONS			% WITH RHEUMATIC FEVER		
	BOYS	GIRLS		BOYS	GIRLS	TOTAL	BOYS	GIRLS	TOTAL
3	5	4	9	244	192	436	2.04	2.08	2.06
4	3	6	9	252	221	473	1.19	2.71	1.90
5	8	10	18	246	259	505	3.25	3.86	3.56
6	5	7	12	332	336	668	1.50	2.08	1.79
7	7	7	14	304	305	609	2.29	2.27	2.29
8	10	10	20	299	339	638	3.34	2.95	3.13
9	3	6	9	237	262	499	1.26	2.29	1.80
10	3	11	14	186	261	447	1.61	4.21	3.13
11	6	6	12	151	229	380	3.97	2.62	3.15
12	2	3	5	79	128	197	2.53	2.34	2.53
Total	52	70	122	2330	2522	4852	2.23	2.77	2.51

In Table III the age and sex incidence of 122 rheumatic fever patients is given. The youngest children included in the series are three years old. There were several records in which a diagnosis of rheumatic fever was made in children younger than three years, but the data on the records was not sufficient to be included in the series. In the twelve-year-old group are included 7 thirteen-year-old children, 2 of whom had rheumatic fever.

The largest admission rate, 3.56 per cent, is in the five-year-old group, the next largest, 3.15 per cent, is in the eleven-year-old group. The smallest admission rate, 1.79 per cent, is in the six-year-old group, the next smallest, 1.80 per cent, is in the nine-year-old group.

Girls apparently were more susceptible to rheumatic fever than boys. Of the 122 children between the ages of three and thirteen years, 52, or 42.6 per cent, were boys, 70, or 57.4 per cent, girls. The admission rate for rheumatic fever in children of these ages was 2.51 per cent, boys 2.23 per cent, girls 2.77 per cent. During the third, fourth, fifth, sixth, ninth and tenth years of life the admission rate was greater in girls than in boys; during the seventh, eighth, eleventh and

twelfth years of life the admission rate was greater in boys than in girls. Boys were apparently slightly more susceptible to cardiac disease than girls.

TABLE IV

THE INCIDENCE OF CARDIAC DISEASE, ARTHRITIS, AND CHOREA IN 52 BOYS AND 70 GIRLS

(122 Cases Diagnosed Rheumatic Fever)

DISEASE	BOYS		GIRLS	
	NO. PATIENTS	PER CENT	NO. PATIENTS	PER CENT
Cardiac Disease	46	88.4	56	80.0
Arthritis	10	19.2	14	20.0
Chorea	6	11.5	13	18.5
Cardiac Disease With Hypertrophy	31	67.4	31	55.3
Cardiac Disease With Decompensation	14	30.4	10	17.8
Death (Cardiac Disease)	6	13.0	5	8.9

It is shown in Table IV that 88.4 per cent of the boys with rheumatic fever developed cardiac disease and 80 per cent of the girls. In the cardiac disease group there was hypertrophy of the heart in 67.4 per cent of the boys and 55.3 per cent of the girls, decompensation in 30.4 per cent of the boys, in 17.8 per cent of the girls. The mortality for cardiac disease in the hospital was for boys 13 per cent, for girls 8.9 per cent.

COMMENT

In 1928 in a group of states with approximately 25,000,000 population, the death rate from heart disease was 228 per hundred thousand. Seham and Shapiro[11] of Minneapolis, in 92 per cent of the cases of early mitral disease obtained a history of rheumatism. Of the 379 cases of organic heart disease in children, 18 per cent were congenital lesions, 74 per cent rheumatic in origin, 3.6 per cent due to other causes, and 4.4 per cent were undiagnosed. In San Francisco about 2 per cent of the total school population has been reported by the school physicians as cardiac suspects. Richter[12] states, "The valvulitis characteristic of the rheumatic syndrome is not uncommon in a mild climate like that of San Francisco but its manifestations are much less dramatic and its inception is far more insidious. Swift[13] indicates that "Rheumatic fever is responsible for between 30 and 40 per cent of chronic cardiac disease in the latitude of the North Atlantic States."

In general about 1.5 to 2 per cent of the population seem to be suffering from heart disease. Clark[14] asserts that about 75 per cent of all cases of heart disease develop in children under ten years of age, and that rheumatic infections are responsible for most heart lesions in this age group.

In New York City from 1907 to 1921, inclusive, there were 5,956 deaths from rheumatism. Of this number 1,916, or 32 per cent, occurred in children younger than fifteen years of age.

From a study made by the New York Tuberculosis and Health Association of 1,078 newsboys ranging in age from ten to seventeen, it was found that 16, or 1.5 per cent, had organic heart disease, more than one-half presented a history of rheumatic infection, especially rheumatic fever; one-third gave a history of tonsillitis and no other rheumatic infection, and one-third gave no history of rheumatic infections. Sutton[15] found in Bellevue Hospital, New York City, 18 per cent of 427 rheumatic children to have well-developed rheumatic carditis without a previous history of either polyarthritis or chorea.

Children of corresponding ages apparently develop rheumatic infections and cardiac complications associated with the condition, at an earlier age in Birmingham, Alabama, than in New York City. When

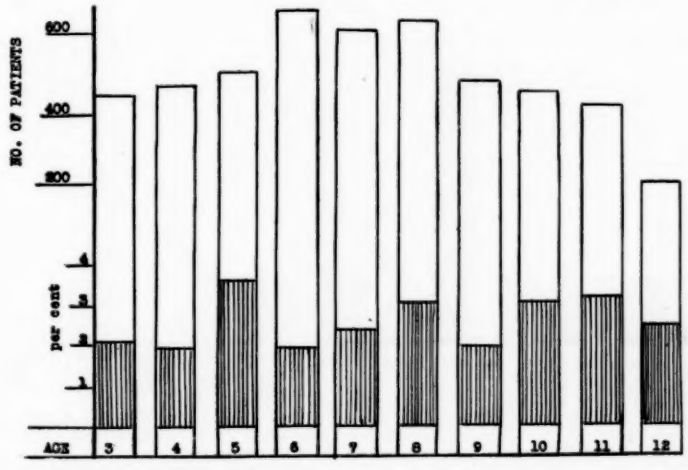

Fig. 1.—The admission rate of rheumatic fever in 122 white children, with groupings according to age in years. Children's Hospital, Birmingham, Alabama.
White column—Total admissions 4,852 patients.
Shaded column—Percentage rheumatic fever.

258 patients with rheumatic infections, reported from private practice in Birmingham by McLean,[10] are compared with 403 patients reported by Wilson[16] from New York City, in children between the ages of two and fourteen years, it is found: (1) The average age of manifestations of rheumatic infections in Birmingham was 5.9 years, the average age in New York was 7.2 years. (2) In Birmingham 74.7 per cent of the 258 patients were seen with a rheumatic infection before the age of eight years, while in New York 50.8 per cent of the 403 patients gave a history of onset of rheumatic infections before the age of eight years. In McLean's Birmingham private practice series the majority of the children were probably seen with the first infection, as 25.9 per cent of the patients were under observation before the age of six months and

43.7 per cent before the age of three years. In Wilson's New York series, approximately 50 per cent of the children were under observation within a year of the onset of the rheumatic infections.

In a comparison of children between the ages of two and ten years with rheumatic infections who developed cardiac involvement, of 90 cases reported by McLean[10] from private practice in Birmingham, and 191 cases reported by Wilson[16] from a Heart Clinic, New York City, it was found: (1) The average age of cardiac involvement in Birmingham was 4.8 years, New York City 6.6 years. (2) Of cardiac involvement in children between the ages of two and six years, Birmingham 67.8 per cent, New York City 28.8 per cent. (3) Of cardiac involvement in children between the ages of six and ten years, Birmingham 32.2 per cent, New York City 71.2 per cent.

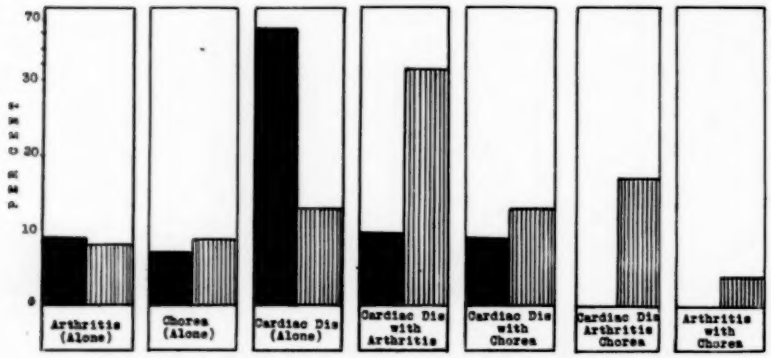

Fig. 2.—The incidence of arthritis, chorea and cardiac disease associated with rheumatic fever in 122 children in Birmingham, Alabama, and 372 children in New York City. (Children between the ages of 3 and 13 years.)

Black column—Rheumatic fever patients, Children's Hospital, Birmingham, Alabama.

Shaded column—Rheumatic fever patients, Heart Clinic, New York City.[16]

When 122 cases of rheumatic fever in children between the ages of three and thirteen years admitted to the Children's Hospital, Birmingham, were compared with 402 cases* in children of corresponding ages reported by Wilson[16] and coworkers from a Heart Clinic of New York City, it was found: (1) The average age of admission Children's Hospital, 7.4 years, Heart Clinic 8.6 years. (2) Admissions before the age of six years, Children's Hospital 29.5 per cent, Heart Clinic 13.4 per cent. (3) Admissions before the age of ten years, Children's Hospital 75 per cent, Heart Clinic 58 per cent.

Fig. 2 and Table V give the incidence in children between the ages of three and thirteen years, of arthritis, chorea, and cardiac disease associated with rheumatic fever in 122 patients from the Children's

*Approximately 86 per cent were diagnosed rheumatic infections.

Hospital in Birmingham, Alabama, and 372 patients reported by Wilson[16] from a Heart Clinic in New York City. The percentage of patients with arthritis, Birmingham 19.6, New York City 65.6; chorea, Birmingham 15.5, New York 41.9; cardiac disease, Birmingham 83.6, New York City 79.3. Arthritis alone, Birmingham 9.8 per cent, New York City 8.4 per cent; chorea alone, Birmingham 6.6 per cent, New York City 8.9 per cent; cardiac disease alone, Birmingham 64.8 per cent, New York City 12.6 per cent.

From the analysis of case records from the Children's Hospital in Birmingham, Alabama, many of the patients being personally studied in the wards, the fact is evident that rheumatic fever in its various manifestations is more common in the South than is generally recognized.

The admission rate was 1.79 per cent for rheumatic fever in children of all ages and 2.51 per cent in children between the ages of three and thirteen years.

TABLE V

THE INCIDENCE OF ARTHRITIS, CHOREA AND CARDIAC DISEASE ASSOCIATED WITH RHEUMATIC FEVER IN 122 CHILDREN IN BIRMINGHAM, ALABAMA, AND 372 CHILDREN IN NEW YORK CITY[16]

(Children Between the Ages of 3 and 13 Years)

DIAGNOSIS	BIRMINGHAM, ALA.*		NEW YORK CITY†	
	NO. PATIENTS	PER CENT	NO. PATIENTS	PER CENT
Arthritis Alone	12	9.8	31	8.4
Chorea Alone	8	6.6	33	8.9
Cardiac Disease Alone	79	64.8	47	12.6
Cardiac Disease With Arthritis	12	9.8	138	37.0
Cardiac Disease With Chorea	11	9.0	48	12.9
Arthritis With Chorea			13	3.5
Cardiac Disease, Chorea and Arthritis			62	16.7
Total	122	100.0	372	100.0

*Of 90 patients in whom past histories were obtained, 32 per cent gave a history of arthritis, 18 per cent chorea.

†Patients observed from 1 to 10 years, data obtained from tables and graphic charts.[16]

In Birmingham, rheumatic fever in children is largely a disease primarily of the heart. The disease is characterized by an insidious onset, and the cardiac involvement is out of proportion to the severity of arthritis. Chorea is characterized by the mildness of the symptoms, a severe case being an exception to the rule.

Longcope analyzed 10,386 case records from the adult medical ward of Johns Hopkins Hospital, and found that the admission rate for rheumatic fever was 1.37 per cent. He states, "That rheumatic fever is practically as common in the hospitals of Baltimore as in the hospitals in Boston, but the character of the disease is not precisely the same, for arthritis in the severe form is certainly not common in Baltimore and arthritis even in a mild degree, occurs in only a moderate

TABLE VI

DISTRIBUTION OF RHEUMATIC FEVER IN THE SOUTH

PLACE	PERIOD	MED. ADM.	NO. R. F. PATIENTS	PER ADM. R. F.	DIAGNOSIS INCLUDES			OTHER MAN. OF R. F. WITHOUT POLYAR.	REMARKS
					POLYAR. (ALONE)	CHOREA WITHOUT POLYAR.	R. H. DIS. WITHOUT POLYAR.		
J. H. Hospital, Baltimore, Md.	Sept., '25 to Oct., '30	10,386	142	1.37	yes	yes	yes	yes	White and colored adult patients
*St. Anth. Hosp., Oklahoma City	1931	1,886	?	0.3 plus	yes	no	no	no	White adult patients Patients white 60%, colored, 40%
*Charity Hospital, New Orleans, La.	1931	11,702	94	0.8	yes	no	no	no	Children 28% White adult patients 85%
*P. P. Vanderhoff, Richmond, Va.	1914-23 incl.	9,985	7	0.07	yes	no	no	no	Children 15%
*University Hospital, Atlanta, Ga.	8 mo. 1932	3,743	5	0.013	yes	no	no	no	White adult patients

*Data obtained from questionnaires.

proportion of cases. Cardiac disease, on the other hand, is extremely common occurring in 95 per cent of the 142 rheumatic fever cases analyzed." If Longcope had used the same classifications to determine the incidence of rheumatic fever in Baltimore, as used by other Southern cities (Table VI), the admission rate for rheumatic fever in Johns Hopkins Hospital would have been 0.56 per cent.

In answer to questionnaire mailed to Charity Hospital, New Orleans, Dr. Edgar Hull states, "In view of the fact that rheumatic heart disease constitutes upward of 10 per cent of the cases of organic heart disease admitted to the Heart Station of this Hospital, it would appear that rheumatic fever in its varied manifestations is quite common in Louisiana."

Dr. Douglas VanderHoff of Richmond, Virginia, in answer to questionnaire states, "During the ten years, 1914 to 1923 inclusive, we have examined 9,985 patients. In that number we had 7 cases of acute rheumatic fever and one of these patients had mitral stenosis. Also, among these 9,985 patients there were 48 instances of mitral stenosis. Of these 48 cases there was a history of acute arthritis in fifteen and of chorea in one."

In answer to a questionnaire mailed to the University Hospital, Atlanta, Georgia, Dr. T. B. Ponton states, "That chorea, rheumatic heart disease, and other manifestations of the condition were not classified as rheumatic fever unless associated with acute polyarthritis."

SUMMARY

1. During a ten-year period the admission rate for rheumatic fever in white children of all ages to the Children's Hospital, Birmingham, Alabama, was 1.79 per cent. In children between the ages of three and thirteen years the admission rate was 2.51 per cent.

2. In 90 of the 122 rheumatic fever patients in whom past histories were obtained, 53 per cent were known to have had heart disease before admission to the hospital, 32 per cent arthritis, 18 per cent chorea.

3. Of the 122 rheumatic fever patients a diagnosis of cardiac disease was made in 83.6 per cent, arthritis 19.6 per cent, chorea 15.5 per cent.

4. Of the 102 cardiac cases, there was definite hypertrophy of the heart in 60.8 per cent, and decompensation in 23.5 per cent. The mortality for cardiac disease in the hospital was 10.8 per cent.

5. Of the rheumatic fever patients 24.6 per cent had the tonsils and adenoids removed before admission to the hospital, in 75.4 per cent the tonsils and adenoids had not been removed.

6. Dental extraction was recommended in 37 per cent of the choreic cases, and dental attention or extraction in 22 per cent of the non-choreic cases.

7. In Birmingham, Alabama, rheumatic fever is largely a disease primarily of the heart. The condition is characterized by an insidious onset, the cardiac involvement is out of proportion to the severity of arthritis and chorea.

8. In a comparison between children of the same age, with rheumatic infections in Birmingham, Alabama, and in New York City, it was found:

a. Apparently children develop rheumatic infections and the cardiac complications associated with the condition at an earlier age in Birmingham than in New York City.

b. The incidence of arthritis was 46 per cent greater in New York City than in Birmingham.

c. The incidence of chorea was 26 per cent greater in New York City than in Birmingham.

d. The incidence of cardiac disease was 4 per cent greater in Birmingham than in New York City.

e. The incidence of cardiac disease alone was 52 per cent greater in Birmingham than in New York City.

CONCLUSION

The varied manifestations, complications and sequelae so often associated with rheumatic fever in the North, is more common in the South than is generally recognized.

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SUBACUTE BACTERIAL ENDOCARDITIS IN A YOUNG CHILD

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IT HAS been suggested by various investigators, Blumer,[1] Poynton[2] and Thayer[3] among the more recent, that subacute bacterial endocarditis is definitely associated with rheumatic fever and may perhaps be another manifestation of the disease. Schlesinger,[4] in a recent paper, differed from this view because of the rarity of subacute bacterial endocarditis in the first two decades, when the rheumatic fever incidence is at its height, and second because rheumatic infections predispose to pericarditis, while subacute bacterial endocarditis rarely is complicated by pericarditis. However, many diseases differ in their response according to the age of the host. This may be due to body defense mechanisms which show considerable variation with individuals of different ages.

It is the purpose of this paper to present the clinical and pathologic findings of a case of subacute bacterial endocarditis in a young child, and to show if possible its relationship to rheumatic fever.

CLINICAL REPORT

I. D., a white female child, five years old, was admitted to the University of California Hospital, August 29, 1930, with a complaint of painful swollen right ankle, anorexia, listlessness and drowsiness for three months. The family history was negative; mother, father and three other children living and well. Her past history to the time of her present illness was negative except for an enlarged thymus noted at birth which cleared up with roentgen-ray treatments; measles and varicella during the first year, and a "severe cold" reported in November, 1928. There was no history of scarlet fever, sore throat, tonsillitis, chorea or joint involvement prior to her present illness.

Present Illness: The child had been well until three or four months previous to admission. In May, 1930, she became listless, lost her appetite, and the mother thought she looked pale. There was no improvement in her condition, and about August first she complained of pain, saying that her fingers and toes were sore. No swelling was noted at this time, but transient joint pains continued until August 29, 1930, when she was unable to walk because of a painful and swollen right ankle. This was associated with a temperature of 101 to 102° F.

Physical Examination: Temperature on admission was 38.2° C., pulse 102 and respirations 24. Patient was a well-developed, but poorly nourished white female child of five years. She was irritable. The musculature was atonic and flabby. No petechiae were seen. There was considerable hypertrichosis. General lymph glandular enlargement was present in the anterior and posterior cervical chains and the inguinal, axillary and epitrochlear nodes were palpable.

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There was a suggestive rheumatic nodule in the suboccipital region. Eyes, conjunctivae and fundi were clear. Mucous membranes of the mouth showed no petechiae, although the pharynx was red. The tonsils were present, injected and edematous. The lungs were entirely clear. Heart: a cardiac impulse was diffuse over the whole precordium from the third to the sixth interspace on the left. P.M.I. was in the sixth interspace, 9 cm. from midsternal line. As this P.M.I. retracted, an impulse was noted to bulge in the fifth interspace. Percussion revealed the cardiac borders as follows: Left cardiac border II 2½ cm. from M.S.L.; III 3½; IV 5; V 8½; VI 9. The right cardiac border was not enlarged to percussion. The rate was rapid and regular. Over the P.M.I. a loud crescendo systolic murmur extending throughout the entire systolic phase and ending in a sharp second sound was present. This murmur was transmitted toward the axilla but was best heard over the P.M.I.; it was also transmitted upward toward the base. No diastolic or presystolic murmur was heard. P_2 was greater than A_2. Blood pressure was 94/64. Spleen was palpable two fingerbreadths below the costal margin. The extremities were negative except for the right ankle which measured 18 cm. (left ankle measured 16½ cm.). It was especially swollen over the internal posterior surface of the malleolus where there were redness, tenderness and definite soft tissue swelling. The ankle was painful on motion.

Laboratory Data: Hgb. 70 per cent (S); R.B.C. 3,050,000; W.B.C. 13,560. Differential count: P.M.N. 75 per cent; urine negative except for trace of albumin. Tuberculin: negative (both human and bovine) with 1:1000 dilution. Blood cultures on September 3 and 9, 1930, showed streptococcus (nonhemolytic) (gamma). Electrocardiogram: rate 126 S.A. tachycardia, right axis deviation, notched P_1, slurred S_1 and R_2 and R_3. Conclusion: evidence of toxic involvement of myocardium (Drs. Kerr and Lagan).

Treatment: Bed rest; sodium salicylate; gr. xx b.i.d.; starch enema; codein 0.015 p.r.n. q. 4 hours; oxygen. Two blood transfusions of 200 c.c. citrated blood on September 13 and 25.

Clinical Course: Patient improved with bed rest and salicylate therapy, and in three days the painful swollen ankle subsided. Temperature, however, remained septic (37.3° to 39.5° C.). The diffuse impulse over the precordium disappeared. The pulse remained rapid. The anemia became more marked and on September 5 the hemoglobin was 66 per cent (S) with W.B.C. 23,200. At this time she complained of severe headaches and suddenly on October 3 she developed acute dyspnea with loud expiratory grunt and became critically ill, the temperature rising to 40° C. On October 4 the hemoglobin was 47 with 3,000,000 red blood cells despite two transfusions. Petechiae were noted on the conjunctivae and over the abdomen. Râles were heard over both bases posteriorly. The heart dilated until the P.M.I. moved outward to the posterior axillary line. The abdomen was distended and on the following day the patient complained of pain in the right upper quadrant. From this time on the patient was in extremis. The respirations were 60 to 120; the pulse was very rapid and weak, 150 to 180; and she became delirious and vomited continually. A pericardial friction rub was noted on October 5. Two days later the patient had a convulsion of the left side of the face, was delirious at intervals and apparently had auditory hallucinations. She died suddenly of circulatory failure on November 4, 1930.

Clinical Diagnosis: (1) Acute rheumatic fever, active
- (a) Polyarthritis
- (b) Myocarditis with hypertrophy and dilatation
- (c) Endocarditis (mitral insufficiency)

(2) Subacute bacterial endocarditis, streptococcus (gamma)

Definition of Subacute Bacterial Endocarditis: In reporting this case we have reference to that type of endocarditis which almost invariably ends in death after a prolonged course of intermittent fever, increasing toxicity and progressive anemia, and in which the blood culture is positive for the streptococcus. At autopsy there are found ulcerating cauliflower-like vegetations on a single or several heart valves as well as occasional mural vegetations.

Etiology: Certain pathologic conditions unquestionably predispose to subacute bacterial endocarditis. Lewis and Grant[5] showed that 26 per cent of 31 cases had congenital malformations of the heart. Rost and Fischer[6] noted 5 congenital malformations in 64 cases of subacute bacterial endocarditis. This undoubtedly is a factor, but there is more evidence to show that previous rheumatic infection very strongly predisposes to subacute bacterial endocarditis. Blumer[1] in 150 cases studied pathologically found evidence of previous infection in 43 per cent. Horder[7] states that in 118 autopsies in subacute bacterial endocarditis 80 per cent showed old valvular lesions and one-half the cases gave a history of rheumatism or some of its associated manifestations. In a series of 12 cases reported by Rost and Fischer[6] 10 had a history of previous rheumatic infection, and one had scarlet fever accompanied by arthritis.

It has been suggested by Poynton,[2] and our case would seem to bear this out, that a given individual never fully recovers from a rheumatic attack in which the endocardium has been involved. The organisms, which have become avirulent on a heart valve flare up when insulted by abuse to the heart muscle or after a superimposed infection.

Age Incidence: It has long been pointed out that subacute bacterial endocarditis occurs in childhood, although many textbooks fail to mention this entity. Its occurrence at the age of five years is extremely rare and for this reason this case is of special interest. In a recent study Leech[8] has reported two cases of Streptococcus viridans endocarditis in children of four years, three months, and four years, five months, respectively, and Streptococcus viridans septicemia without endocarditis in a baby of fifteen months. In a recent review of the literature Rost and Fischer[6] were unable to find a single case reported before the fifth year. In 149 cases reported by Libman[9] but one occurred in a child under ten years of age. In a recent general review of subacute bacterial endocarditis in childhood Comby[10] states that there have been but 5 cases reported at the age of five years and but 2 at six years. In the case which we are presenting the patient had just passed five years of age when she entered the hospital.

AUTOPSY FINDINGS

General Examination: The skin had a dusky yellow, "café au lait" pallor. There were a few recent petechial hemorrhages in the skin of the left upper arm and in the conjunctiva of the left eye. The lymph nodes in the posterior cervical

and submaxillary triangles, and in the axillary and inguinal regions were moderately enlarged and palpable. The tonsils were moderately large and had the roughened surface and irregularly sized crypts of chronic inflammation.

Mediastinal and Pleural Structures: The thymus was normal in size and position. Each pleural cavity contained 700 c.c. of clear yellow transudated fluid. There were no old or recent inflammatory pleural changes. The lung parenchyma had the reddish-yellow color of severe passive congestion and had small recent bronchopneumonic consolidations near the hilar regions of the lower lobes.

Heart: The pericardial cavity had no adhesions and contained 100 c.c. of clear transudated fluid. The heart was normally formed, weighed 220 grams and had moderate left ventricular myocardial hypertrophy. The mitral valve held many yellowish, soft and friable villous vegetations. These vegetations had grown down along the chordae tendineae and completely eroded the chordae of the anterior cusp. There was an upward mural extension of the vegetations for about 1 cm. into the left auricle.

Abdominal Organs: The gastrointestinal tract had no changes. The liver weighed 800 grams and showed recent congestion. The spleen weighed 120 grams and had a large, raised, yellowish-white infarcted zone almost replacing the upper pole. This infarct was found to be fluctuant and to contain soft necrotic and purulent material. There were numerous other smaller and more recent splenic infarcts. The kidneys were riddled with infarcts of varying ages. The older, larger infarcts in the kidneys were softened and necrotic.

Brain: The brain weighed 1200 grams and had marked vascular engorgement. There was an evident zone of hemorrhage and softening presenting along the sylvian fissure near the tip of the right temporal lobe. After formalin fixation the brain was sectioned and showed a large, softened, hemorrhagic infarct, 6 cm. long and 3 cm. in maximum width, in the right temporal lobe.

Microscopic Tissue Examination: The *lung* sections showed early passive congestive changes and scattered zones of peribronchial pneumonia. The *heart muscle* bundles were spread apart by edema. There were a few infiltrated interstitial polymorphonuclear leucocytes and lymphocytes. There was no evidence of old inflammatory reactions, such as fibrosis or Aschoff body formations, which might characterize an old rheumatic myocarditis. The *endocardium* was raised by underlying edema, and the *valve* tissue holds fibrin, platelets, leucocytes and many blue-staining clumps of streptococci. Early fibroblastic organization at base of the vegetative material along the valve was present. The *liver* showed early congestive changes. A large part of the sections from the *spleen* and *kidneys* were made up of necrotic infarcted tissue lightly infiltrated by polymorphonuclear leucocytes. The tissue distant from the infarcted zones showed only congestive changes. The *brain* sections showed wide replacement of cortical tissue by a softened degenerate mass holding many erythrocytes and a few leucocytes. Many sections of the other organs and tissues were examined and showed nothing more unusual than congestion.

Bacteriologic Examinations: A culture was made in glucose veal broth of the material in the large pyemic splenic infarct. A pure growth of short-chain, gram-positive streptococci was obtained. On blood agar plates the colonies were of the gamma type, appearing as tiny, clear dewdrops, and showed neither hemolysis nor green methemoglobin production. Culturally these organisms were identical with those grown from the blood during life.

Smears were prepared of the crumbly mitral valve vegetations and of the soft material in the spleen, kidney and brain infarcts. These smears all revealed apparently pure collections of gram-positive streptococci, morphologically similar to the cultured organisms.

The tissues and organs were searched for evidence of an initial rheumatic fever, but none could be found. There was no pericarditis, nor old fibrosis with

Aschoff body formations in the myocardium. The mitral valve held soft villous vegetations with no evidence of the small, smooth globular nodules, or old fibrous thickening and contraction held to characterize rheumatic endocarditis.[11] No proliferative nor exudative lesions were found about the smaller arterioles and capillaries in the generalized fashion emphasized in rheumatic fever.[12] No intimal lesions were found in the aorta nor pulmonary artery as described in rheumatic fever.[13] There was no rich capillary fibrous pleuritis, nor the other pleural and pulmonary changes now being stressed in the pathology of rheumatic fever.[14] Instead the anatomic findings are those of a subacute progressive endocarditis with all the vicious circle of valve destruction, septicemia, myocarditis, multiple embolic phenomena and severe congestive heart failure.

ANATOMIC DIAGNOSIS

Subacute progressive endocarditis (gamma streptococci in blood cultures during life). Acute myocarditis. Advanced congestive heart failure with hydropericardium, bilateral hydrothorax, hydroperitoneum and passive congestion of the viscera. Multiple infected infarcts in the kidneys and spleen. (Gamma streptococcus in culture from spleen.) Infected hemorrhagic infarct in the right temporal lobe of the brain. Early bronchopneumonia. Chronic tonsillitis.

SUMMARY

A five-year-old child complaining of lassitude, pallor, fever and polyarthritis, was admitted to the hospital. The fever was intermittent in type, and the child developed petechiae, splenomegaly, progressive anemia, leucocytosis and hematuria. The heart was enlarged and there was a mitral insufficiency. The child developed auditory hallucinations and convulsions. Repeated positive blood cultures for streptococcus gamma type were obtained. The autopsy findings were typical of bacterial endocarditis. No evidence of previous rheumatic infection could be established pathologically.

CONCLUSION

A case of subacute bacterial endocarditis is reported in a child of five years made more unusual by the presence of the gamma streptococcus and an initial clinical picture of acute rheumatic fever.

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FILTERABLE BACTERIA AND THEIR SIGNIFICANCE*

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FIFTY years ago, while the hatred engendered by the Franco-Prussian War was still smouldering ominously, the medical world was startled by the announcement from an hitherto unrecognized investigator, Robert Koch[1] that he had isolated and cultivated the tubercle bacillus, and that descendants of this culture, grown outside the body in artificial nutritives, would reproduce the disease, tuberculosis, in experimental animals.

The immediate effects of this momentous discovery were akin to those following any radical departure from the usual course of events. Certain theologians decried it on the grounds that sickness was a penalty of sin, and that it was an act of impiety to attempt to reveal the workings of Providence. The germ theory of disease was yet to come, and many physicians scoffed at the notion that an insignificant little microbe could be the inciting agent of such a formidable disease as tuberculosis. In at least two well-known medical schools, one in St. Louis, and one in Chicago, the deans actually prohibited the use of microscopes in their halls of learning.

However, the good work spread, and within a few years the isolation and identification of a considerable number of bacteria, the inciting agents of such formidable diseases as typhoid, diphtheria, pneumonia, cholera and many others, were accomplished. The science of immunology arose, that subtle erudition which contemplates complex reciprocal relationships between host and parasite.

As a result of this remarkable piece of work, the perils of childbirth have been assuaged, and the death rate during the first year of existence has been markedly reduced, the expectance of life has been lengthened by some two decades, another new science, preventive medicine, has come rapidly to the fore, and the entire social fabric has been altered, at least in the United States. At the time of Koch's epoch-making discovery, we were a nation of young people; now due to achievements of sanitation and preventive medicine, direct outgrowths of his great work, we are rapidly becoming a nation of middle-aged people, and the economist will find ample exercise for his talents in the social problems inseparably associated with this prolongation of life. The medical problems of middle age are also of sinister import. Cancer, cardiorenal dis-

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*Address before the American Academy of Pediatrics, New Orleans, May 14, 1932.

eases and insanity are prevailing as never before, and in the future medicine must give much attention to them.

The history of science is replete with instances in which the discovery of new methods or procedures has advanced the frontiers of knowledge, often to a remarkable extent, but none has had greater influence and significance than the momentous discovery of Robert Koch, that bacteria capable of inciting disease in man may be reared in pure culture outside the animal body. In other words, the great achievement of Koch was not after all the isolation of the tubercle bacillus, magnificent as that was, but rather the formulation of a method for the artificial cultivation of various organisms.

For three fruitful decades the application of this method to the study of bacteria, crude and uncertain at first, but gradually perfected, led to extraordinary success in the conquest of disease. Then, as the initial surge of discovery waned, a group of formidable ailments which had hitherto eluded thorough investigation, a clinically heterogeneous group which in the aggregate causes untold loss in lives, time and wealth, came persistently to the fore. In this category are exanthemata, influenza and the common cold, the encephalitides, certain types of rheumatic fever, arthritis and endocarditis.

Although these diseases differ markedly among themselves in their clinical course, their infectivity and their mortality and morbidity rates, they possess in common one outstanding feature—in artificial, sterilizable mediums their etiologic agents either have eluded isolation and identification, or at best have proved quite refractory to study. Many are said to be filter-passing organisms, invisible, unstainable and uncultivable, although probably capable of survival in tissue-enriched media. Inasmuch as members of this widely diversified group differ so radically from current concepts of bacteria, it is suggested that they be placed in a separate category, which for want of a more definite appellation is designated "filterable viruses."

Seeking an explanation of the refractoriness of this group of diseases to artificial cultivation, one cannot but be impressed with a distinct point of difference between the chemical character of the natural environment of these "viruses" in the tissues of the body, and that of the traditional culture media usually relied upon for their nourishment in the test tube. In the former, the body of the host, the organisms are enmeshed in the protein of the tissues. This tissue environment, so far as current information goes, is the hereditary, exquisitely specific chemical architecture of the animal itself, and is free, or nearly free, from protein digestion products. In the test tube on the contrary, the pabulum offered to the microbe is essentially denatured, partly digested protein—peptone, enrichable, to be sure with bits of tissue, blood or other body fluid. It is not without significance that most of the reported successful attempts at cultivation of these

"viruses" have been made in media which contain some unaltered or nearly unaltered protein in addition to the usual cultural ingredients. Such cultivations have been severely criticized, perhaps properly, as cultural fictions unworthy of the name. In any event, in the great majority of instances, although it is quite probable that organisms have been kept alive extracorporeally for a short time, comparatively little has been learned about them. It is increasingly evident that if the postulates of Koch, which involve intensive study, are to be fulfilled, some artificial cultural medium must be devised to support their growth in the test tube.

Inasmuch as certain members of this refractory "filterable virus" group are of great concern to pediatricians, a word about them will not be amiss. Some, as smallpox and measles, influenza and common cold, are among the most contagious of diseases. Others, as arthritis and certain types of endocarditis, are presumably not communicable. All, so far as is known, are tissue parasites, exhibiting exquisite tissue specificity; in some instances at least, a change in host alters their virulence. Thus, passage of smallpox virus through a series of calves modifies the originally dangerous smallpox virus into the protective cow pox or vaccine virus. Similarly, in the well-known Pasteur treatment, passage of the rabies virus of dogs through a series of rabbits actually transforms the lethal agent to a protective one. Attention is drawn in passing to the shifting of virulence in response to change in host. The exquisite specificity of serologic reactions by which closely related bacteria may be differentiated one from another has an analogy among the "virus diseases" which manifest an equally exquisite host specificity. It is perhaps unnecessary to point out that the ordinary laboratory culture media, containing denaturized protein (peptone) do not encroach directly upon this question of host (protein) specificity.

To return to the growth of "viruses" refractory to cultivation: thus far, interest has been centered of necessity upon negative attempts to prove that members of this group cannot be bacteria, rather than upon constructive efforts to establish their true nature. It is admitted even by the more conservative interpreters of this phenomenon that the limitations of the "virus" group are difficult to establish, and that apart from their pathology and pathogenesis, the characteristics by which they are classified are on the whole negative rather than definitive. Yet the life history, the biology, of those agents that cause acute infection agrees in important particulars with the life history or biology of certain diseases whose inciting agents are known to be bacteria. Finally, there is no general agreement as to which organisms should be included in the group of "filterable viruses" and which should be excluded. Aside from their exquisite tissue parasitism, one of the prime objections to the inclusion of members of the "virus" group with the bacteria,

has centered around the fact that these "viruses" are filter-passers, whereas bacteria are deemed incapable of passing filters successfully. Hence one method of reconciliation (if reconciliation is indeed possible) would be to produce unequivocal evidence that under appropriate conditions at least some bacteria may become filter-passers, and that in the filter-passing state they exhibit at least some of the characteristics of "viruses," namely; invisibility, unstainability, and refractoriness to cultivation. This would not, of course, settle the problem, but it would at least serve to bring the "viruses" and bacteria into juxtaposition for further study.

For a quarter of a century there has been discernible the gradual development of a new concept in bacteriology; the idea that bacteria may exist not only in the visible, stainable, cultivable, nonfilterable state, in which they have been commonly known and recognized, but also that they may become filter-passers. The evidence, meager at first, has developed into an extensive literature.[2] Among the earliest observations are those of Novy and Knapp[3] upon the filtration of the organism of relapsing fever. This was followed by an important contribution by Almquist[4] upon the filterability of *B. typhosus*, and by those of Fontes,[5] Valtis,[6] and Panek and Zakharoff[7] upon the tubercle bacillus and the pus from cold abscesses, and attempts were soon made to induce the filterable state of bacteria by stress conditions, through contact with lithium and other salts,[8, 9, 10, 11] and through aging broth cultures. In the aggregate, these studies appear to constitute formidable support for the view that bacteria, when subjected to definite conditions, may indeed become filter-passers.[12] The assertion that leaky filters are the sole explanation for these apparently successful filtrations becomes increasingly difficult to defend in light of the number of investigations involved. The evidence rather points unmistakably to the existence of a filter-passing state of bacteria.[13] The procedures used to induce this filter-passing state, however, stress, chemical agents and the time required for the purpose, do not seem to offer any very direct parallelism with conditions existing in the tissues of the diseased body where the filter-passing organisms are found.

The immediate objective of this discourse is to bring to your attention a series of experiments, frankly few in number and performed with crude materials, which nevertheless seem to afford evidence that the filter-passing state of bacteria, in which they are invisible, unstainable and uncultivable in ordinary laboratory nutrient media, may be induced quite readily and rapidly under conditions fairly comparable with those in the diseased body. The observations may in addition provide a clue to the cultivation of at least certain of the refractory "viruses" outside the body in artificial, sterilizable media. These experiments, while not formally attempting to reconcile the "virus" concept with

filterable forms of bacteria, do have some possible significance (which is not stressed at this time) indicative of a closer relationship between filterable forms of bacteria in the test tube and certain phenomena of microbic growth in the tissues. The initial studies mentioned in some detail elsewhere[14] will not be retold here other than to state that a gram-positive diplococcus was isolated from certain cases of influenza through the use of a special protein-rich, peptone-poor medium hereafter referred to as K medium.[15]

Organisms from the blood streams of the influenza patients, introduced directly into this medium, flourished in the unstainable, invisible state, although attempts at subculture from them into ordinary media were not successful, even in enriched, ordinary peptone containing nutritives. After several transfers in K medium, a small amount of the culture from each of two of these cases was introduced into each of two rabbits respectively. Within twenty-four hours after injection, spasmodic coughing ensued in each rabbit, which persisted for some days, accompanied by slight, concomitant fever. Forty-eight hours after injection, blood was withdrawn from each rabbit, and the respective serums were filtered through Berkefeld filters. From these filtrates, growth was reinduced in K medium, and after several successive transfers in this medium, during which time the organism remained invisible, growth was eventually obtained on agar plates as very fine, clear, small, almost invisible dewdrop colonies. These, upon repeated cultivation on agar, became firmly established as the gram-positive diplococcus referred to above. In other words, this diplococcus seems to have been present in the filterable state in the blood stream of both patients and rabbits, and it was recovered in the nonfilterable state.

Many interesting and important possibilities present themselves at this point: Have these organisms any relationship to the disease? Are the organisms contaminants? Are they fortuitous vagrants in the blood stream? And by far the most far-reaching query of all, do bacteria living in the tissues of the animal body in a protein environment become filterable? If these questions may be answered in the affirmative, it follows logically that bacteria, ordinarily deemed unfilterable, should become filter-passers if cultivated under reasonably similar conditions, namely, in media rich in protein and poor in peptone.

To test this hypothesis, a culture of B. typhosus (Rawlings strain) was inoculated into protein (K) medium. It was filtered successfully thrice in four days through Berkefeld filters with interim cultivation of the filtrate in K medium. It is essential to state here that the filter-passing organism developing in K medium from this typhoid culture was unstainable, and invisible under the microscope. After each filtration it

was recovered, however, by plating upon agar, as a visible, stainable, cultivable, and agglutinable bacillus, having all of the tinctorial, cultural, and serological reactions of B. typhosus.[16] At this point, two interesting phenomena, analogous to corresponding features of the growth of filterable bacteria in the body, intruded themselves. First, the typhoid bacillus, transferred from ordinary peptone media to protein (K) medium, became a filter-passer quite rapidly, and with apparently little difficulty, and second, the filter-passing form of the typhoid bacillus obtained by successive growth in K medium with interim filtrations soon became acclimatized or parasitized in the protein environment. In this state, in which it is invisible and unstainable as well as filterable, it refused to grow directly when transferred from K medium to plain or glucose nutrient broth, a medium in which, as is well known, the nonfilterable, "peptophilic" bacillary form grows readily. Stated differently, this filterable, "proteophilic" form of B. typhosus exhibits in common with some of the "filterable viruses" both the ability to grow in a protein environment and the concomitant inability to grow in this filter-passing state in ordinary peptone-rich media. It appears to remain steadfast in the filter-passing state.

These observations and others of similar character seem to indicate that bacteria cultivated in protein-rich, peptone-poor media may become filter-passers, and in this filter-passing state, during which they are invisible, unstainable, and uncultivable in ordinary cultural media, they have at least superficial resemblance to "filterable viruses."

Brief mention has already been made of a medium (K medium), very crude and primitive, designed to meet as well as may be two important desiderata, namely, to contain protein with little or no peptone in imitation of the tissues of the body, and to be sterilizable. Earlier experiments with this medium, the ultimate isolation of bacteria in the nonfilterable form from the blood stream in certain cases of influenza, and the inductance of the filter-passing state in an authentic culture of B. typhosus, suggest that the premise upon which this medium is based is tenable. Subsequent investigations of similar character indicate that the medium, with all its limitations and defects, has apparently justified itself. A word about its preparation may be pertinent here.

Small intestines of freshly killed hogs are opened, cleaned, rinsed rapidly with warm water, partly dried, and dropped directly from a meat grinder into several volumes of 95 per cent alcohol. After the mixture has stood for two days with interim stirring, the alcohol is filtered off and fresh 95 per cent alcohol is substituted. This is repeated thrice. The dehydrated, extracted residue is then dried before a fan, and extracted with benzol. Finally the benzol is removed, first by filtration, then before the fan, and the dry mass is reground with the meat chopper. In this state the material will keep for weeks. For

reasons that are wholly unknown, hog intestine appears to be better for the purpose than human intestine. Intestines of rabbits, cats and dogs have proved quite unsatisfactory.

For ordinary cultures, 50 to 100 mg. of the dry, extracted hog intestine is suspended in 6 to 10 c.c. of Tyrode solution, to which sufficient additional $NaHCO_3$ has been added to bring the reaction to P_H 7.3 to 7.6 after autoclaving. Enrichment may be achieved, if desired, with bits of sterile tissue. If filtration experiments with streptococci or staphylococci are to be attempted, glucose should be added to the hog intestine medium. At the time of inoculation, blood cultures automatically enrich it with the blood constituents of the host. This is undoubtedly of considerable value, as it affords an opportunity for the microbes growing in the blood stream to become acclimatized gradually from the host proteins to the protein of the test tube. Organisms from the blood stream which are uncultivable in the ordinary laboratory media usually require several days of incubation before sufficient multiplication occurs to insure growth in subcultures in K medium. Growth in subcultures is indicated by a slowly developing clouding or increase in turbidity above uninoculated controls of like initial turbidity, which must always be incubated in parallel. In like manner, laboratory cultures of bacteria, grown in K medium and filtered through Berkefeld filters, engender increasing turbidity when reintroduced into K medium from the filtrate. It is very important to note that subcultures from original blood cultures, and filtered cultures of bacteria in K medium, are usually invisible, unstainable and uncultivable in ordinary laboratory media. They can, however, be continuously subcultured in K medium. Eventually the organisms may be regained in the nonfilterable state, in which they are visible, stainable and cultivable in laboratory media, by plating out upon the surface of nutrient agar plates. Often repeated replatings are necessary, and older cultures in K medium, seven to fourteen days old, will usually yield visible colonies where less mature K medium cultures will be refractory to cultivation upon agar.

A word must be interjected here about the procedure for recovery of bacteria in the nonfilter-passing state from filter-passing bacteria growing in K medium but refractory to growth in the ordinary laboratory media. Experience gained thus far with a very considerable number of cultures obtained from the blood stream of patients as well as from cultures of bacteria in the filter-passing state, indicated very clearly that direct transfer to nutrient broth media is very often unproductive of results. In fact, the only procedure that has proved to be reasonably feasible has been to streak the culture from K medium heavily upon the surface of agar plates. Older K medium cultures, six to ten

days, are usually better than younger K medium cultures for this purpose. The phenomena elicited are rather unusual. For several days after inoculation nothing may be seen: then a very delicate veil-like haze appears within the inoculated area. This is difficult to see and is readily overlooked. From the veil-like growth, tiny, transparent, dewdrop colonies usually develop. These may be subcultured on agar plates until more hardy colonies are obtained. Often, however, it is necessary to rub over the hazy area, either with sterile saline or glucose broth. Within the rubbed area, very delicate colonies may be seen after several days. These phenomena are quite unlike those encountered in the cultivation of ordinary bacteria, and doubtless many otherwise successful isolations are therefore unrecognized. In addition, the morphology of the bacteria found in the first tiny colonies is extremely varied; often, indeed, the cultures appear to be impure. It may take many retransfers upon agar to elicit the characteristic morphology of the fully "peptonized" organism, and to regain fully its characteristic chemical reaction.

One other phenomenon which is frequently encountered should be emphasized. It often happens that smaller inocula, both of blood from patients and of filtrates from filtration experiments, yield evidence of growth in K medium when larger inocula are apparently unavailing. This is contrary to expectation, but the observation has been made so many times that it cannot be overlooked as an experimental fact, even though an explanation is not available at present. A parallel instance of another angle may be cited. A staphylococcus phage, which had apparently remained sterile for some six months, had a potency such that it would "phage" a suitable culture of staphylococcus in a dilution of 1:100,000. Nothing could be cultivated from it upon any ordinary cultural medium. Some of the culture was added to K medium in tubes each containing 6 c.c. as follows: of the original phage, 1 c.c. and 1 loop respectively, also 0.1 c.c. of the following dilutions of the phage, made with sterile salt solutions: 1:10, 1:100, 1:1,000, 1:10,000. After several days, growth appeared in those tubes of K medium containing phage diluted 1:100 and 1:1,000. None occurred, or at least none was detected, in any of the other tubes. After two subcultivations in K medium, a typical staphylococcus was finally isolated upon agar plates from the tube having the 1:100 dilution. From this experiment, and from others of similar character, it would appear possible that the "phage principle" whatever it may prove to be, exercises an inhibitory action upon the development of the phaged organisms, forcing them back to the nonfilterable state as it were, until a dilution is reached where it is no longer effective. As for definite information about the nature of the "phage," however, any explanation of this strange inverse

relation between concentration of phage and growth of phaged organisms must be regarded as wholly tentative. It may be stated in passing that older phage preparations, even though they have relatively great "phage" potency, are in general more favorable for the recovery of specific organisms than fresher samples.

To return to the phenomena of growth elicitable in K medium and its significance. One of the outstanding features manifested by bacteria in the filterable state, whether engendered by the action of salts,[8, 9, 10, 11] by aged cultures, or induced by growth in K medium, is their obvious reluctance to pass back again to the nonfilterable state. This seems to be equally true in those few samples of bacteriophage in which recovery of the specific organism has been successfully accomplished. Emphasis has been placed upon certain correlative details of bacteria in the filter-passing condition; their invisibility, their unstainability, and their uncultivability in nutrient laboratory media. It will be recalled that some, if not many, of the heterogeneous "virus" diseases previously mentioned manifest in common precisely these same general but not definitive characteristics, namely, invisibility, unstainability, uncultivability in nutrient laboratory media, and probably filterability. This again raises the important question, what relation, if any, exists between these artificially induced, filter-passing bacteria, growing in the culture tube, and the existence of bacteria in the filter-passing state in the body?

At first sight, it might appear to be a simple matter to settle this point by causing suitable bacteria, through growth in K medium, to pass into the filter-passing state, and then to inoculate animals with them and thus to elicit the clinical disease or its animal equivalent. Conversely, bacteria, incitants of specific diseases, which have been cultivated from the blood stream and then brought back to the nonfilterable state, might again be rendered filterable and reinjected to elicit the proper pathologic response. Unfortunately the problem is not so simple. From experience of the past, there is ample evidence that change in host protein alters virulence. Instances of this have already been cited, as that of modification of the smallpox virus to cowpox virus, the loss of virulence of the virus of rabies for man and dog by passage through rabbits. Host specificity is also manifested to a high degree by bacteria that are well known; the human type of tubercle bacillus is extremely virulent for guinea pigs, but not particularly so for rabbits, while even the typhoid bacillus, so far as is known, will not produce the clinical complex of typhoid except in man and certain anthropoid apes. The problem, therefore, is complex, but by no means hopeless of solution.

The question may well be asked then, of what value is this attempt to cultivate in K medium filter-passing organisms and those which have thus far proved to be refractory to growth outside the body in artificial media? Granted that in a few instances such cultivations have been rewarded by the eventual isolation of bacteria in the visible, stainable, cultivable state from the blood stream, one may with absolute justice demand proof that these microbes are not in reality fortuitous vagrants. This is a very distinct possibility. If it be true, the facts are still well worth further investigation.

In summarizing briefly the clinical possibilities that may accrue from a study of hitherto refractory diseases through the use of protein-rich media, one may mention first the use of blood cultures (which possess certain obvious advantages over nasal washings) from cases of exanthemata, influenza and the common cold, as well as arthritides, rheumatic fever, endocarditis, and the encephalitides. In the second place, isolation of definitive, cultivable organisms from at least some of these diseases may possibly pave the way for the acquisition of facts concerning their etiology. If nothing can be cultivated in the test tube, things are as they were in the beginning. As the matter now stands, little is known about these illnesses. In the third place, the process of putting bacteria into the filter-passing state, with due regard for the protein specificity of the host, which is the reverse of cultivating bacteria in the filter-passing state as visible organisms, may in specific instances throw some light upon at least some of the infections which have thus far baffled science. Finally, new aspects of immunity may be opened up for investigation. The part played by the humoral and the cellular defenses of the body against infection will require additional consideration if invisible, filter-passing organisms play a part in the generation of disease.

It is very freely admitted that this brief presentation of a new procedure in bacteriologic investigation asks many more questions than it can answer at the present time. It must be remembered, however, that the field of microbiology upon which it encroaches has been a field of speculation for the last fifty years. Any procedure, however inadequate, which may start a new advance into the mysteries of the diseases refractory to current study may be regarded as useful.

And in conclusion, the questions of priority are often difficult ones to agree upon; nearly two thousand years ago, Lucretius[17] seems to have had a definite conception of the existence of germs in two states: thus

> "The seeds of things, the primeval germs we teach
> Whence all creations around us came to be
> First, since we know a twofold nature exists
> Of things both twain, and utterly unlike. . . ."

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ANTIQUES OF PEDIATRIC INTEREST

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IN MOST Greek cities, the child was the absolute property of the father. The father decided whether the infant was to be exposed or reared. The cost of bringing it up, doubts concerning paternity and the necessity of splitting up the inheritance equally among the male children made exposure very common. Final decision regarding the infant's fate was made on the fifth day of its life before the Goddess of the Hearth. Usually the first child was saved, the second child, especially if it were a girl, might be exposed. The infant was abandoned in a frequented part of the city, carefully wrapped up and

Ancient Greek Toys

1. **Rattle in form of pig. Greece, 400 B.C., unglazed pottery.**
2. **Child's lecythus, Milo, 300 B.C., glazed pottery, height 8 cm.**
3. **Toy bull, Greece, 300 B.C., unglazed pottery.**

wearing trinkets about its neck or placed in a basket by its side as an inducement to some stranger to rear it. In Thebes, the father was not allowed to desert his infant. If, due to poverty, he was unable to rear it, the infant was carried before the magistrates who delivered it to some one willing to care for it. When grown up, the foster child became the servant of the person who had consented to rear it. In Sparta, if the child were deformed or puny, it was condemned to death by exposure; if well matured, it was allotted its portion of the common land.

In the Homeric days, maternal nursing was the rule; but in later days, when the power of Athens was at its height, wet nursing by Spartan women or slaves was the most common method of infant feed-

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ing. This custom of mercenary nursing which was at first confined to the rich finally became almost universal among all classes of society. However, among the Lacedemonians, it was almost a general rule that the mother nurse her own infant. Of the two sons left by the seventh king of Lacedemonia, the younger was chosen as ruler, since the elder had not been nursed by the Queen and hence was not considered to have succeeded to all the virtues of his parents. After the child was a year old, the nurse fed him a sort of broth made of pulse sweetened with honey, barley porridge and goat's milk cheese.

One of the first of the child's toys was a clay rattle in animal form, whose hollow body contained a pebble. This had been invented "in order that, having the use of this, children may not break any of the things in the house, for the little creatures cannot keep still." Later, small animal models and mounted figures made of baked clay were presented to the child. He was provided with dogs, tortoises or ducks as pets. He played blindman's buff, romped with balls, and tested his power of balance by jumping upon an inflated wine skin which had been smeared with grease.

At the age of seven, the paedagogus, an elderly male slave, began to escort the boy to school. There he was taught reading, writing, arithmetic, drawing, music and simple geometry. A good deal of time was spent in physical culture, wrestling, running and throwing the spear. In the Olympic games, special races were arranged for the boys.

At eighteen years, the boy's name was enrolled in the city tribe to which he belonged, and he took up his career as a soldier.

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Critical Review

ALLERGIC DISEASES

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THE study of allergy is so recent as to present many difficulties in attempting a comprehensive review. A lack of uniformity of opinion with regard to both theory and practice is obvious and the present discord, together with the increasing volume of published reports makes comparative analyses and interpretations difficult.

As is usual in biological sciences, there is to be found some differences of opinion which result solely from an attitude of mind. For instance with regard to nomenclature and classification, some prefer terms which emphasize and catalog dissimilarity while others prefer a broad grouping which emphasizes points of similarity. There is also to be seen the enthusiastic overstatement of zealots and conservative appraisal of doubters, the truth lying somewhere between.

To those interested in allergy, the appearance in 1929 of the *Journal of Allergy*[1] devoted exclusively to that subject (sponsored by the Society for the Study of Asthma and Allied Conditions and by the Association for the Study of Allergy) was a noteworthy advance. Recent publication of several textbooks on allergy also shows the increased interest in the subject. Four exceptionally good textbooks appeared in 1931. Coca, Walzer and Thommen,[2] *Asthma and Hay Fever in Theory and Practice*, treat at great length the theoretical considerations. Rackemann's[3] book, *Clinical Allergy*, with a different point of view, covers the same field. Vaughan's[4] *Allergy and Applied Immunology* is shorter than the preceding two but with Bray's[5] *Recent Advances in Allergy* will probably find wide use by persons unable to read the more exhaustive treatises. The most recent text on allergy is by Rowe,[6] *Food Allergy;* this gives a detailed discussion of the use of diet in allergy to food. Another book, Urbach's[7] *Skin Diseases and Nutrition*, has been recently translated into English by Schmidt and is devoted largely to a discussion of allergic skin conditions.

GENERAL CONSIDERATIONS

Rackemann's[8] review of von Pirquet's original concepts of allergy in the new *Journal of Allergy* emphasized the similarity with other immunologic mechanisms. "What we call 'allergy' may be nothing more than anaphylaxis in man." While granting the inheritance of the capacity to become sensitive, he stressed the probable acquisition of sensitiveness and objected to the consideration of a fundamental difference in the allergic constitution. From a clinical study, Rackemann and Colmes[9] were unable to recognize differences between the allergic and the normal with regard to weight and blood pressure. There did

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seem to be, however, a slightly greater susceptibility to respiratory infections and to tuberculosis in the allergic group. Coca,[10] on the other hand, emphasized or reiterated his etiologic classification according to mechanism, incidence, desensitization and hereditary factors. He recognizes four distinct types: Anaphylaxis, Atopy, Tuberculin Sensitiveness and Serum Disease. Atopy (strange disease) embraces only those human manifestations which are hereditarily controlled (asthma, eczema, hay fever, etc.).

It will be recalled that Coca's original concept of atopy considered a further separation from anaphylaxis on the basis of the absence of demonstrable antibodies. With the discovery of passive transfer of the skin-test (Prausnitz-Küstner) substance, he has modified his point of view by applying the term "reagins" to these newly discovered antibodies but emphasizes their dissimilarity to precipitins.

The skin test, first anticipated as an infallible guide in the study and treatment of allergic conditions, has proved otherwise. Alexander and McConnell[11] have stressed the variability according to the site of the tests, those on the back and abdomen being more intense than on the extremities. That this may be a skin-cell variant, they demonstrated by tests with histamin on nonallergic individuals. Smyth and Bain[12] have shown that epinephrin (and ephedrin) iodides and recent severe allergic manifestations may also interfere with the test; in addition, there may be a fault in the testing substances. Finally, they claim that clinical sensitivity may accompany negative skin tests due to an inherent inability to form the antibody. The reverse also holds since individuals may give marked skin reactions without having clinical manifestations of allergy. Rackemann[13] also reports the presence of sensitization without skin tests while Rowe[14] suggests the possibility of discarding the skin tests for foods in favor of trial diets based on the percentage frequency of certain foods. Balyeat[15] claimed that a fair percentage of newly born infants gave positive tests. Smyth and Bain,[16] on the contrary, found the response to trauma more intense in the young, and hence false-positives might be obtained while the true skin test would not develop, regardless of clinical sensitivity phenomena, until late in the first year. Stuart and Farnham[17] first noted the disappearance with increasing age of the skin tests to foods. Rinkel and Balyeat[18] consider the skin test a sign of skin sensitivity only. They do not, however, explain the rôle of the skin-test antibody (reagin) or why clinical symptoms, referable to organs other than the skin, are so frequently associated with positive skin tests.

Progress in the field of immunology has, of course, stimulated studies of a similar nature in clinical allergy. Anderson, Schloss and Stuart[19] have continued their studies of precipitin development and its possible relation to allergy. Landsteiner's[20] work on haptenes (lipoids which affect the specificity of antigens) and Avery and Heidelberger's[21] discovery of specific but apparently nonantigenic polysaccharides, have led to a closer analysis of common allergens. Black[22] reporting the isolation of a specific complex carbohydrate in ragweed pollen, contends that the earlier viewpoint on the protein nature of allergens lacks proof. The biologic activity of the substances is not dependent on the nitrogen content. Assuming Black's contention to be correct, nitrogen content cannot be considered a reliable gauge in the standardization of allergens.

Moore, Cromwell and Moore[23] have subjected various pollens to a variety of chemical extractives, analyzing the extracts for nitrogen. They found, by the method of exhaustion of locally sensitized skin, biological evidence for at least three distinct antigens (allergens) in giant ragweed and timothy pollens. The search for common denominators in group allergens led Stull, Cooke and Chobot[24] to test the various fractions of giant and low ragweed pollen. They found the water extract of the two pollens chemically and biologically identical. Support for this is obtained from the morphology of the various pollen grains, as judged by the botanical surveys (to be mentioned later). They also regard the albuminous fraction as the most active fraction in timothy. The absence of this in cat-tail pollen is, they suggest, the reason for that pollen being inert despite its presence in atmospheric pollen.

Further evidence of group relations was brought out by Sellers and Adamson[25] who found four out of six chenopod pollens possessed a common biologic (test) factor. Forster,[26] and Ratner and Gruehl[27] as the result of research on experimental animal anaphylaxis, believe they have proof of a relationship between horse dander and horse serum. Van Leeuwen,[28] from a clinical skin-test study found no evidence of a common fraction in animal emanations.

The work of Lewis,[29] Manwaring[30] and Dragstedt[31] and others suggests a new interpretation of the Wolf-Eisner theory. This theory presumes that an intermediary product from body cells reacting with antigen is responsible for anaphylactic (or allergic?) responses. Lewis's studies in urticaria suggest that a histamin-like substance may be so liberated from skin cells. Horton and Brown[32] have reported favorably on the use of histamin in graded therapy for the treatment of urticaria from cold and this may be an important link between physical allergies and responses due to chemical allergens.

PASSIVE TRANSFER STUDIES

The Prausnitz-Küstner technic has made possible many studies. Peshkin and Fineman's[33] study of passive transfer in children showed definitely that it was of restricted clinical value. Walzer and Bowman[34] found that abnormal skin conditions of the recipient did not interfere with the test. Allergic (atopic) recipients, however, gave slower response and were not so reliable. Cohen, Ecker and Rudolph[35] also obtained a delayed response to passive transfer on allergic individuals following parenteral injection of ragweed pollen. Markin[36] found refractory skins in recipients which he termed hypoirritable though he did not analyze the cause. In contrast with Coca[37] but in agreement with Lamson, Piness and Miller,[38] he had a diminution in skin tests after clinical treatment. Colmes also found diminished skin test reactions in 91 per cent of treated cases. Markin found more intense reactions to inhalants than to foods. He did not mention, however, the peculiarly marked reactions to egg and fish nor the possibility of faults in the preparation of the food allergens.

Smyth and Bain[39] were unable to recognize factors in the recipient which affected passive transfer and concluded the response depended entirely on the titer of the sensitizing serum. They also investigated passive transfer in newly born infants as applied to the problem of antigen (allergen) secretion in mother's milk but found no evidence to

support this contention. With somewhat different technic Donnally[40] reported positive findings. Smyth and Bain[41] were unable to obtain passive transfer with cord blood despite positive maternal skin tests and Bell and Erickson[42] later substantiated this finding. Placental transmission of antibodies has, however, been demonstrated in guinea pigs by Ratner,[43] who concluded from similarity of skin tests on mother and offspring that congenital hypersensitivity may exist in the human being by placental (not chromosomal) transmission.

Following the Walzer[44] passive transfer test which used oral administration of the atopen (allergen), Smyth and Stallings[45] showed absorption of the allergen from the colon contrary to the theoretical expectation. The skin-test antibody was found by Smyth and Bain[46] in the pseudoglobulin fraction of the serum. Later, but independently, Sherrer[47] confirmed their report. Becker and Black,[48] however, in one attempt were unable to obtain any concentration effect from a serum which itself did not give passive transfer.

In contrast to the results of Levine and Coca[49] but in agreement with those of Gay and Chant,[50] Foran and Lichtenstein[51] found that mixtures of sensitizing serum and atopen (allergen) gave reactions similar to the usual passive-transfer and showed no evidence of neutralization of either component.

While Coca[52] has considered the reagin (skin-test antibody) restricted to atopy and not found in serum sickness, Tuft and Ramsdell[53] have shown that passive transfer may be obtained with serum taken at the height of serum sickness. The reviewer has repeatedly confirmed their report. Severe immediate constitutional reactions to serum have been reported by Lamson[54] but shown by Sutliff[55] to be at present unpredictable. It may be that precipitins or anaphylactic antibodies are present in high titer in such cases. Tuft[56] has also reported insulin sensitivity and obtained passive transfer phenomena. Experiments by Lewis[57] have shown the sensitizing effect (dermolysin) of serum from an individual with urticaria from cold which might well be considered a proof of passive transfer of physical allergy or sensitivity. Jadassohn reported passive transfer of skin test to ascaris extract, and Caulfeild and La Rush[59] to Staphylococcus hemolyticus extracts. Biberstein[60] claimed to have obtained passive transfer of skin test even to chemicals (mercury) though Jones and Jacobs[61] were unable to obtain it in nirvanol poisoning. Ramsdell[62] has shown a technic using dye by which passive transfer of human skin sensitivity may be made manifest in the guinea pig skin. It would seem that the skin-test antibody is not so restricted in its scope as was at first considered.

PATCH TEST—DERMATITIS, ETC.

Bloch's[63] classical study of primrose dermatitis proved that this type of "altered reactivity" could be acquired by inducing it in himself. He also showed the value of the contact or patch test in dermatology where it has found wide clinical application. From the work of Ramirez and Eller[64] it would appear a much more specific test for contact excitants than the scratch or intradermal tests. Adelsberger[65] and later Smyth and Bain[66] found it unsuited for young infants because of the sensitivity of their skin to mechanical and general irritants regardless of specificity. Concerning contact dermatitis Brown, Milford and Coca[67] have isolated an oil from ragweed which gives a pos-

itive patch test but negative scratch test, showing that the excitant is not atopic (allergic) and the condition resembles sumac, poison oak and primrose sensitivity. Pilot[68] has found a similar oil fraction associated with chrysanthemum dermatitis. Welker,[69] reporting tulip bulb dermatitis found both aqueous and ether extracts gave positive patch tests while only the ether fraction gave positive scratch tests. Gay and Ketron[70] reported a study of ragweed dermatitis in which the patch test to the pollen, its concentrate and the oil extract (of Brown, Milford and Coca) were positive. Passive transfer was obtained but there was no improvement until after the pollen season was over. The pollen oil did not induce dermatitis in this ragweed hay fever patient; they believe the pollen oil needs further proof. Stroud[71] had positive skin test reactions in 24 out of 50 dermatitis cases. He did not report the use of the patch test. It seems to the reviewer that while some contact dermatoses may be responses limited to the skin and not necessarily associated with allergic humoral antibody evidence, other instances of dermatitis may not be so clearly defined. In differentiating the pure contact dermatitis, the patch test may be extremely useful, but it obviously does not escape the introduction of both traumatic and allergic factors.

POLLEN STUDIES

Stimulated no doubt by the work of Seegal and Seegal[72] in rabbits, Peshkin[73] investigated the use of an ophthalmic test in hay fever patients. Using dry pollen which may be washed out after the test is obtained, he found a varying degree of vascular response where the usual skin test might be negative. A nasal test using dry pollen is described by Efron and Penfound.[74]

Botanists have called attention to characteristics of the conifer pollens which might perhaps exclude them as etiologic factors in hay fever. In most places this has been borne out clinically except for the Texas cedar (Juniperus Sabinoides) which Black[75] has shown by biological skin tests to be related to the very distant Port Orford cedar of Oregon. Kahn and Grothaus[76] reported a similar relationship to a cedar found in Florida. Cobe,[77] however, brings evidence to support a sensitivity to black spruce (Picea Mariana). It would be interesting to know whether a biological relationship might be found with all these conifers. The reviewer knows of no reported clinical sensitivity to the Port Orford and Florida cedars though it is logical to suppose that there is such a sensitivity.

It has been shown that the pollen from hothouse plants is more active in skin-test response than that of field plants (Wilmer and Cobe).[78] An extensive study by Balyeat and Rinkel[79] has established the paper mulberry as a new cause of hay fever. This shrub is found in the southern states and from eastern Texas to the Atlantic Ocean. Urticaria, due to grass pollen and without respiratory symptoms, has been reported by Taub and White.[80] Considerable study has been made of the atmospheric pollens. The importance of botanical surveys and their use in the interpretation of skin tests and the treatment of hay fever is clearly evident. With group reactions, skin tests to many pollens may be obtained which are not necessarily found in the patient's environment; in addition, the seasonal incidence and the abundance of pollen must be considered. Durham[81] and Hopkins[82] have reported the effects of humidity, sunshine, barometric pressure, drouth,

etc., on the ragweed pollen as judged by survey. Durham's[83] work over a wide area of this country has made him an authority on most of the "ragweed area." He has collected atmospheric data from 22 cities contrasting urban with agricultural districts.[84] Pollen surveys have been made in Miami, Florida[85]; Baltimore, Maryland[86]; San Joaquin Valley, California[87]; Central Arizona[88]; Needles, California[89]; New England[90]; Memphis, Tennessee[91]; in the Pacific Northwest[92]; in south central Texas[93]; Toronto, Canada[94]; and New Orleans, Louisiana.[95]

The reviewer finds some of the pollen surveys to be too extensive with a paucity of comment on clinical aspects. It would seem to him probable that while biological relationships among pollens are not equally close, yet unquestionably the average clinician should not require all the pollens for diagnosis and treatment.

NEW ALLERGENS

Perhaps the most interesting new allergens are those of insect origin (inhalants). Figley[96] reported on May fly asthma and rather conclusively indicated the rôle of the air-borne fragments of the filmy insect. Similar observations concerning caddis flies were made by Parlatto[97] who also cited moths and butterflies as probable offenders. In addition to biological tests, the scales from the wings of lepidoptera are found on the slides for pollen counts. Balyeat, Stemen, and Taft[98] not only confirmed Parlatto's findings but found these factors at higher altitude levels than pollen grains.

An interesting study of bee-stings from an allergic point of view, reported by Benson and Semenov[99] demonstrated three factors: venom, pollen effects and the intrinsic (bee) allergen in the sting. Ellis and Ahrens[100] have called attention to the air-borne bee allergen from contact with the pollen. Sternberg[101] has reported a case of asthma "excited by the bedbug" and a case of sensitiveness to cuttlefish bone was reported by Weston.[102] Insulin sensitivity would seem to be well established according to Tuft,[103] Grishaw,[104] and Allan and Scherer.[105] Trichophyton hypersensitivity with test phenomena has been reported by Sulzberger and Kerr.[106] Various molds are discussed as allergens by Balyeat, Stemen and Taft,[107] Bernton,[108] and Jimenez, Cuenca and Puig.[109] New fungi reported by Cobe[110] and by Towey, Sweany and Huron[111] have occupational significance since Cobe's were associated with tomato vines (greenhouse work) while Towey's were sporelating on the bark of maple trees from which railroad ties are made.

Some new phases of sensitivity to glue have been discussed by Andrews and McNitt[112] and Grant[113] has presented and reviewed six new cases of flaxseed sensitivity. Unger[114] in discussing drug sensitivity stressed the coal tar derivatives but group relationships are not apparently shown. Duke[115] has reported contact sensitivity to ether and chlorine with conjunctival, nasal, bronchial or skin manifestations, depending on the point of contact. Sensitivity to pantopon,[116] procaine,[117] quinine from skin lotions,[118] arsphenamine,[119] oil of cade,[120] wool fat[121] and ephedrin[122] have all been reported. The response to certain intravenous chemicals, such as the recently reported Acacia,[123] shows a blending between the anaphylactoid responses described by Hanzlik and Karsner[124] and the more usual type of antigens. A most valuable study of poison oak sensitivity was made by Straus.[125] Infants, whose skin was negative to the patch test, could be sensitized by inunction or

orally with resulting positive tests in 72 per cent of cases. The parallel to Cooke's[126] study of streptococcus sensitivity by the Dick test is striking.

BACTERIAL ALLERGY

Nevertheless bacterial allergy remains a most difficult type to study as well as to treat clinically. Besides the work of Cooke on scarlet fever, Clawson[127] and Irvine-Jones[128] on rheumatism, Hansen-Pruss, Longcope and O'Brien[129] have found evidence for streptococcal sensitivity in some types of nephritis. The work of Dorst and Morris[130] suggests the rôle of certain strains of colon bacillus in producing symptoms. Vaccines from stool culture have long been used by the French and while considered by some to be nonspecific in nature, some evidence of an allergo-toxin is being found.[131] Pilot[132] found most heated bacterial filtrates when tested gave reactions varying with the age of the individual. The same was reported by Derick and Fulton[133] in their studies of extracts of hemolytic and green streptococci. Burky[134] reported toxic and nontoxic fractions of staphylococcus filtrate, which in rabbits showed increased susceptibility with age. These fractions may prove parallel in reactions to those of the streptococcus.

An excellent scientific review of present knowledge of bacterial allergy is that of Zinsser.[135] Similarity and dissimilarity in bacterial and nonbacterial allergy are presented by Pottenger.[136] From the standpoint of clinical allergy, Cooke's[137] discussion of infective asthma is very helpful. He considers it related to other types of allergic asthma but not identical with them. Walker,[138] one of the first to study the use of vaccines in this type of condition, has published a further report of the types of streptococcus involved in the causes and treatment of chest colds and asthma. Harkavy and Hebald[139] reported that 47 per cent of his 400 asthmatics were on an infective basis, nine of the 47 per cent having an associated arthritis. Famulener[140] uses heat-killed bacteria in autogenous vaccines standardized by bacterial count and Sterling,[141] bacterial suspensions for intradermal tests. As mentioned before, Caulfeild and La Rush[142] obtained passive transfer of staphylococcus hemolyticus skin test. In tuberculin allergy, to the reviewer's knowledge, passive transfer was successful only by skin graft. This would point to a fixed cellular response and explain the rôle of patch test, etc. The field of bacterial allergy is probably very pleomorphic and would be expected to show marked differences in mechanism as judged by the marked differences in the organisms themselves (streptococcus vs. tubercle bacillus). It appears to the reviewer that heat-killed bacteria may offer some obstacle as a source of skin-test allergen due to the alteration from the state in which they are found in the animal host and the preparations of Kreuger[143] will probably substantiate this contention.

PHYSICAL ALLERGY

Duke[144] continues to report instances of heat and effort sensitivity. He believes a wide range of functional cardiac conditions may be associated with physical allergy. Harris, Lewis and Vaughan,[145] as well as Bray[146] have reported studies of cold sensitivity and the latter substantiates the value of histamin or graded exposure cited by Horton and Brown.[147] Inamori[148] has reported a cure of paroxysmal hemoglobinuria by the injection of spirocheta morsus muris. The Wassermann

test remained positive but the Donath-Landsteiner test became negative. Urticaria solaris,[149] eczema solare[150] and porphyria[151] have all been studied. This suggests to the reviewer that the hemolysin of hemoglobinuria, as studied by Donath and Landsteiner[152] may have a parallel antibody in photic sensitivity which results in the abnormal porphyrin production.

CONSTITUTIONAL STUDIES AND THERAPEUTIC NOTES

While, as mentioned earlier, Rackemann[153] found no evidence of peculiarity of physical measurements in the allergic individuals, a search for metabolic differences continues to be made. Criep,[154] however, was unable to detect appreciable changes of metabolism in patients with urticaria, as judged by carbon dioxide, sugar, non-protein nitrogen and calcium estimations. Lierle and Sage[155] have found no abnormal values in calcium, phosphorus and potassium in serum or spinal fluid. Oriel and Barber[156] reported a toxic proteose fraction in the urine of asthmatics which they consider of specific (skin-test) nature and of probable value in therapy. Bray,[157] however, was unable to isolate it from the urine of allergic children and doubts the specificity of the fraction. The latter,[158] however, found hypochlorhydria in chronic asthmatics which suggests an alkaline tendency as a cardinal feature of allergic constitutions. He advised therapeutic use of hydrochloric acid and glucose. In this regard it is interesting to note Scheer's[159] claim for the relief of infantile eczema with the use of hydrochloric acid milk. The latter, however, has not been substantiated. Beckman[160] is also apparently convinced of disturbed acid-base balance and found evidence for acid therapy to counteract the alkalosis tendency. He postulated the infrequency of diabetes and allergic manifestations, sea voyages and high altitudes as beneficial because of acid production. The reviewer would point out that the effect of high altitude is toward alkalosis production (by forced respiration) and that change or freedom from offending inhalants is a more likely interpretation. Hurst[161] advocated the use of carbon dioxide in rhinitis, hay fever and asthma which has quite the opposite effect from that of high altitude, but also introduces a specific effect on the respiratory center even though a true acidosis producing agent. From our knowledge of peripheral-splanchnic functions,[162] it would seem probable that disturbances of acid-base equilibrium might be secondary to allergic manifestations, especially asthma, but not primary or causal. Kern and Teller[163] observed a lower basal metabolism in asthma, eczema, etc., and suggested a hypothyroid association, while Oehme and Paal,[164] using the Reid Hunt test for hormones, suggested hyperthyroid activity in allergy. Criep and Wechsler[165] considered metabolic factors such as thyroid coincidental, contributory or resultant but not causative. Huber[166] believes there may be involvement of the sex hormone in the female allergics. Swern[167] found only six diabetics in a group of 4,000 asthmatics and considered diabetes (acid condition or endocrine?) of beneficial effect in allergy. In view of the increasing frequency of reports of insulin hypersensitivity (the reviewer has three such patients) and the presence of hay fever in two out of his group of 30 juvenile diabetics the hypothesis of Swern seems difficult to accept. The ketogenic diet has been tried therapeutically in the treatment of asthma and Peshkin[168] and Stoesser[169] reported varying results. Perhaps dietary control and accidental avoidance of

food allergens were factors where this was successful. Stoesser found restriction of water of no value but a high carbohydrate diet helpful. Intravenous glucose he found comparable to epinephrin in therapy. Hyperthermia is perhaps the most recent general measure to be tried; the results are so far encouraging as reported by Miller and Piness,[170] and Carpenter and Warren.[171] Whether the induction of heat directly is better than that induced by nonspecific protein therapy, remains to be confirmed. The varying effects of infections, pregnancy, etc., seem to the reviewer to resemble shock effects on the immune mechanism, functioning in some cases in the onset of allergic conditions while in others it may terminate a previous allergy complex.

Unger[172] reported electrocardiographic studies showing myocardial damage in the majority of asthmatics. Criep[173] did not reach the same conclusion. Waldbott,[174] and McLaughlin[175] reported the incidence and effect of hypertension, the latter in a study of blood pressure in 881 allergic patients. Considerable interest in allergy is manifested by certain otolaryngologists. Proetz[176] believes middle ear conditions and sudden maxillary sinus reactions are related to sensitivity. Hansel[177] presented a comprehensive clinical and histopathologic study of the nose and sinus in allergy and urged conservative treatment. Feinberg[178] is also conservative regarding surgery and finds belladonna better for rhinitis, ephedrin better for hay fever, calcium of little value and a large number of skin tests necessary. Bullen[179] argues against tonsillectomy being of value in allergic conditions. It would appear that the indications for adenotonsillectomy are the same in allergic and nonallergic individuals. Lehrfeld[180] called attention to ocular manifestations in vernal conjunctivitis occasionally found after the pollen season is over. He considered radium of value in relieving the acute stages but it was not in the same category with allergy treatment.

The pleomorphic clinical symptoms of allergy were spectacularly illustrated in a case report by Vaughan and Hawke.[181] The angioneurotic edema gave manifestations of abdominal pain, cough, hydrarthrosis, sinusitis, brachial paresthesia, kidney colic and paralysis. Egg and tomato were the chief offending allergens. Some instances of Henoch's purpura with joint involvement are definitely allergic.[182] Headache is being considered with increasing frequency[183] as an allergic manifestation and epilepsy[184] is reported in the same category by some but needs further substantiation. Enuresis,[185] pyloric stenosis,[186] colitis,[187] and duodenal ulcer[188] are but a few conditions which have been suggested as having an allergic basis. It seems to the reviewer unfortunate that progress in a new field of medicine is usually followed by reports of relationships with all types of unsatisfactory and poorly defined syndromes.

There is increasing evidence in favor of the perennial treatment of hay fever[189] though too long intervals between injections may lead to general reactions. Brown[190] claims safe and successful treatment with large doses of pollen while small doses are advocated by Anderson[191] and Vaughan.[192] It is the opinion of the reviewer that the therapeutic dosage may vary with the individual patient; one requiring relatively large doses, another small amounts. Van Leeuwen[193] reports further use of allergen-free chambers for observation and treatment of inhalant sensitive patients.

The use of specific peptones (propeptans) is advocated by Urbach[194] for food allergy though Rowe[195] was unable to obtain results with

peptone therapy. The latter, while considering oral and hypodermic administration of foods in graded doses, considers the avoidance of offending foods the most reliable form of treatment. Waters,[196] and Hopkins, Waters and Kesten,[197] discuss the use of the elimination diets (Rowe) in the Vanderbilt Clinic and also report success with the specific peptone administration in that clinic. Piness and Miller[198] reported 80 per cent positive skin tests in a group of 4,589 patients. Diet restriction was guided by the skin tests.

The genetic classification of foods as promoted by Vaughan[199] and Ellis[200] seems logical but the reviewer thinks there may be less group reaction and greater specificity regarding food allergens than is apparent in pollen allergens. Further confirmation of the use of oral peptones seems warranted. Regarding dietary restriction, caution is advisable for its use with children since the nutritional result may be worse than the allergic symptoms for which the diet was instituted.

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American Academy of Pediatrics

Proceedings

SECOND ANNUAL MEETING OF THE AMERICAN ACADEMY OF PEDIATRICS

FRIDAY AFTERNOON SESSION
May 13, 1932

Round Table Conference on Pyuria

Leader: Dr. Henry F. Helmholz; Assistants: Dr. C. W. Burhans and Dr. John A. Bigler.

Abstract: Round Table Discussion of Pyuria

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Both clinical and pathologic studies are bringing to our attention the importance of the urinary tract as a site of disease in infancy and childhood. The finding of urinary infection with pyuria is common. The largest group of pyuria cases are of the simple type, often called cystitis and pyelitis, which run a short course and get well with or without treatment. In a smaller group there is some associated lesion, either congenital or acquired, other than the infection and it is this group which will be considered.

We know that congenital anomalies of the urinary tract are of frequent occurrence. In necropsy series, the incidence has been reported as high as 1.3 to 12 per cent. Not all of these anomalies have been of the obstructive type causing urinary stasis. For example, simple reduplication of the kidney pelvis and ureter is common but obstruction in the anomalous ureter is comparatively uncommon. As yet no figures have been published of the frequency of infection with pyuria in cases with obstruction, although it is commonly stated that stasis leads to infection and that all cases with stasis become infected.

In a group of 85 children, admitted to the Children's Memorial Hospital, with pathologic changes in the urinary tract, other than infection, the lesion was of a congenital nature in 81 per cent. In 61 per cent of the cases obstruction with urinary stasis was present and of these 87 per cent were congenital lesions. At the time these lesions were diagnosed clinically or found at necropsy, pyuria was present in only 38 per cent. The patients varied in age from a few weeks to twelve years. The same type of lesion was found at all ages with and without pyuria.

The site of obstruction in the congenital anomalies was most frequent at the pelvo-ureteral junction, in the uretero-vesical region, at the bladder neck or in the posterior urethra and at the distal end of an anomalous ureter in cases of reduplication. Rarely a ureteral valve or a nonpatent ureter was found. Acquired obstructions were due to urinary calculi or to the pressure of tumors either within or outside the urinary tract. In no instance was a ureteral stricture found which could be attributed to scar tissue from a previous inflammatory process.

The source of infection in these cases seemed to be either by way of the blood stream or of the ascending type through the lower urinary tract. In several cases with obstructive lesions infection and pyuria did not develop until after catheterization or urologic investigation. In these we know definitely that the infection was of the ascending type. On examination of the specimens, there was infection of the ureter and pelvis on the side with obstruction, and in some cases the infection could be traced from the pelvis into the medullary portion of the kidney adjacent to it while the cortex would show no evidence of leucocytic infiltration. In other cases with infection following instrumentation, the whole lower urinary tract was markedly infected as were the medullary and cortical portions of the kidneys. In cases with obstruction in which it seemed probable that the blood stream was the source of infection, a generalized pyonephritis was present or at times only multiple abscesses in the kidney tissue. Usually there was also infection of the pelvis and ureter on the side of obstruction but not when obstruction was absent. A pyonephritis was not found in all cases with inflammatory reactions in the ureters and pelves.

That a pyuria may not always follow infection of the kidney was demonstrated in several cases in which kidney abscesses were present and yet the urine contained no pus cells even at necropsy. In sections of these kidneys no pus could be found in the tubules. Presumably none of the abscesses had broken through into the tubules so that no pus cells were present in the secreted urine.

To summarize briefly: Congenital anomalies of the urinary tract are common and a large proportion of them are accompanied by urinary obstruction and stasis. Infection and pyuria may occur early in life or not for some years even though obstruction and stasis is marked. This leads us to believe that children with urinary stasis do not develop urinary infection any easier or more frequently than normal children, but once infected rarely get rid of their infection when the stasis is overcome as was formerly believed. Because of the absence of infection and pyuria obstructive lesions may go unrecognized for many years. Ureteral strictures due to scar tissue from previous inflammatory reactions seem to be extremely rare. A normal urine does not mean a normal urinary tract. The infection may involve the whole urinary tract or any part of it. Infection in our experience has seemed to be by way of the blood stream, or of the ascending type, by way of the lower urinary tract.

Symptoms and Diagnosis of Pyuria

C. W. Burhans, M.D., Lakewood, Ohio

In bringing before you this part of the symposium which deals with the symptoms and diagnosis of pyuria, we are faced with the fact that the symptoms are well known to every member of this group and that the diagnosis in the last analysis depends almost entirely on the demonstration of certain elements in the urine. Modern research has added little to our knowledge of these two aspects of the disease. Consequently we shall try to stress only the main symptoms and points in differential diagnosis as related to the various types of pyuria.

The symptoms are so variable that it is impossible to describe a typical case. Those most constantly present are fever, anorexia, restlessness, irritability and pallor.

The onset is often abrupt, so that the patient appears seriously ill within the period of a few hours. On the other hand, it may be most insidious, not unlike the onset of typhoid fever. Vomiting is common at the beginning and may continue for some time. During infancy, diarrhea is a frequent accompaniment and may mask the diagnosis. Chills occur, especially in older children and although rare in infancy from any illness, pyuria is probably as frequently the cause as any other

single infection. Convulsions when present generally accompany a sudden rise in temperature, but may occur in mild cases and later in the course of the disease would point toward a more serious involvement of the kidney parenchyma. Meningismus, delirium and even a comatose state are not so unusual.

Fever is usually present to some degree although it may be so slight that it does not arouse the mother's suspicions. At the other extreme temperatures of 105° or 106° F. are not unusual. It may be of the sustained type and drop by crisis so that the chart resembles that of lobar pneumonia. A remittent type is more common and then other variations are possible. The fever may be present for only a day or two or may persist at a high level for three or four weeks. The writer recalls one case in which there were daily peaks to 104° F. for three weeks and then a sudden flattening to normal just after a request for urologic consultation.

Pallor is a fairly constant symptom and is usually associated with cool extremities. It is due to a reflex constriction of the arterioles and should not be confused with true anemia. A secondary anemia does, however, develop in many cases and may be of a serious nature.

Although most sick children are likely to be restless and irritable some writers associate these symptoms particularly with pyuria. The irritability is especially outstanding in the mild cases and it is not uncommon for mothers to diagnose correctly relapses or recurrences on the basis of anorexia and irritability.

Localizing symptoms are not usually found during infancy, although occasionally inflammation of the external genitalia may be the result of, or at least be associated with, an infection of the urinary tract. Manifestations of colicky pains in the abdomen when they occur are often due to the associated gastrointestinal disturbance.

Abdominal pain is sometimes the first symptom in older children, and tenderness and muscle spasm may be detected on examination. The loin, the path of the ureter and the region over the bladder are the most common sites for these symptoms. When tenderness and spasm are situated on the right side a difficult problem in differential diagnosis is encountered. Unusual tenderness in the region of the kidney, perhaps associated with local heat, and high body temperature will suggest a suppurative process. In hydronephrosis the kidney may be palpable. The presence of a mass in the lower abdomen after urination often means an incomplete emptying of the bladder. Paroxysmal attacks of pain would immediately bring to mind the possibility of a stone.

Frequency, straining, a burning sensation, spontaneous enuresis both diurnal and nocturnal, attract the mother's attention, but I believe these symptoms occur in less than one half the cases of simple pyuria and they may be due to other causes. Dribbling of the urine would suggest some disturbance in the neuromuscular control of the bladder. Violent straining may be caused by obstruction to the outlet of the bladder, either an anatomical abnormality or calculus. Frequency with tenesmus is common in renal tuberculosis.

The physical examination of the patient with uncomplicated pyuria brings forth no characteristic findings, but it is just this lack of findings that should suggest pyuria.

The blood in infections of the urinary tract generally shows a moderate leucocytosis and as mentioned previously, often there is a reduction in the hemoglobin content and number of erythrocytes. In simple pyuria the nitrogenous elements of the blood are found to be within normal limits, but when there is damage to the kidney, either from extension to the kidney substance or from obstruction below, there will be a retention of these substances usually temporary in an acute attack.

DIAGNOSIS

This might be divided into three problems: first, to establish correctly the diagnosis in all true cases of pyuria; second, not to diagnose pyuria in the absence of adequate proof; and third, to determine if possible, the etiology.

The solution of the first problem presupposes that an examination of the urine is a part of every complete physical examination. The urine in pyuria shows at some time, leucocytes and bacteria, traces of albumin, oftentimes red blood corpuscles. The urine from normal boys taken in the usual way may contain two to three leucocytes in the low power field of an uncentrifuged specimen, while that from girls may contain six to eight cells. The special value of a centrifuged specimen for the diagnosis of pyuria, is questionable. Every specimen in a case of pyuria does not always show an increased number of cells, in fact, they may be absent, or occur only in small numbers for periods of several days, especially at the beginning of the disease, even in the severe types. Therefore, several examinations may be necessary. In doubtful cases it has been our custom to obtain a night and morning specimen daily for three successive days.

Since pus and bacteria in the urine may come from an inflammation of the external genitalia especially in girls and this inflammation may be scarcely visible to gross examination, a catheterized specimen should be obtained whenever there is any doubt about the diagnosis. Helmholz has further emphasized the fact that unless a culture of the urine is made the physician will never know when the patient is cured, that is, when the urine is sterile. Except in cases of obstruction to the outflow, there apparently is very little danger of introducing infection by catheterization. Litmus lactose agar and blood agar plates are the best media, the first furnishing quick information on the organisms of the colon group, the second on those of the coccus family.

Bacteria can be grown from the urine in a certain percentage of healthy children, especially infants, but these are usually present only in small numbers. In typhoid and paratyphoid fevers and occasionally in other infections a true bacteriuria may occur without the presence of pus. Pus without bacteria is likely to mean either a tuberculous infection or one due to some unusual organism such as leptothrix which does not grow readily on ordinary media.

The second problem, that of an incorrect diagnosis, will be solved if the above precautions are taken. It is probable that this is a very common error. When a patient has suffered previously with pyuria, one is likely to draw conclusions too quickly. The examination of voided specimens, frequently only one, plus the pressure of anxious parents for a definite diagnosis, are the cause of further errors. A pediatric colleague told me that he studied the charts of all the cases on which a diagnosis of pyuria had been made in a certain hospital and came to the conclusion that 50 per cent were probably wrong. Helmholz cites an instance in which a voided specimen showed enough pus and bacteria to warrant a diagnosis whereas a catheterized sample taken a few minutes later not only was free from pus, but was sterile on culture.

Further diagnostic measures are indicated when special etiologic factors are suspected. I refer to such conditions as anomalies of the urinary tract, disturbances in the neuromuscular control of the bladder, hydronephrosis, abscesses of the kidney, tuberculosis or other rare types of infection such as that of the leptothrix. Frequently the only suspicion of these conditions is a persistence of the disease beyond the usual time limit, in spite of adequate treatment. In other instances, unusual findings in the history or physical examination may point toward more than a simple pyuria. Some of these have been described under the symptoms.

As a conclusion a brief outline will be given of the various steps which can be followed to arrive at a diagnosis of pyuria and an understanding of its etiology.

1. History and complete physical examination.

2. Microscopic examination of several voided specimens. (If the patient is a girl, the external genitalia should be cleansed before urination.)

3. Catheterization: To obtain a specimen free from contamination, for examination and culture, and for animal inoculation if tuberculosis is suspected. Necessity for immediate information may also be a reason (especially in infants and children who are too ill to cooperate). Catheterization may also reveal urethral obstruction and if performed after voluntary urination it may detect the presence of residual urine.

4. The P. S. P. test and blood urea determination—tests of kidney function.

5. *Roentgenograms:* Of the urinary tract for calculi or other foreign bodies; or possible malformations or enlargement of the kidney. Of the spine for spina bifida, other diseases which may affect the nerves which control bladder functions, or scoliosis which is sometimes due to suppuration in or around the kidney.

6. Intravenous injection of substances which during excretion are opaque to *roentgen rays;* iopax, neo iopax (uroselectans, neo-uroselectans) or skiadan.

7. Cystogram: Injection into the bladder of sodium iodide or other suitable solutions by which the outline of the bladder can be made out, also possible ureteral regurgitation.

The last two procedures perhaps belong to the realm of the urologist although they do not require any high degree of technical skill.

If the above scheme does not result in a cure or satisfactory explanation of the symptoms, the urologist should be called in consultation. It has often been said that if a pyuria persists for from three to six weeks, the patient should have the benefit of urologic consultation. There can be no set rule and in some instances his aid should be sought on the first day.

Cystoscopic examination can be performed now on infants only a few weeks of age (less difficult in females) and even ureteral catheterization is possible at much earlier ages than formerly.

The Treatment of Pyuria

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The treatment of the acute stage of pyelitis has not undergone any change in recent years. Large amounts of fluid are given by mouth when possible, and, if vomiting occurs, rectally, subcutaneously, intraperitoneally, intramuscularly, or intravenously. Water is administered by mouth, and physiologic solution of sodium chloride, when given, by other channels. In anuretic cases 20 per cent solution of sucrose can be given intravenously at the rate of 2 c.c. each minute, until 5 c.c. for each kilogram of body weight has been given. This frequently will bring about a flow of urine. For infants up to three months of age, from 1,000 to 1,500 c.c. of fluid should be given each day, and for those who are more than one year of age, up to 2,000 c.c. Older children should be given as much in excess of this as they will take. Alkalinization of the urine is still recommended by most pediatricians on a strictly clinical basis, without any evidence that it influences the infection beneficially more than the same amount of fluid without alkalinization. Pyelitis, uncomplicated by anomalies, is usually a self-limited disease, the duration of which is extremely variable, so that the effect of treatment in the acute stage is difficult to evaluate, especially as the urinary features remain the same after disappearance of fever and of other symptoms of infection.

I usually use equal parts of sodium bicarbonate and sodium citrate, giving 5 grains (0.30 gm.) of each, dissolved in water, five to six times a day and in-

creasing the dose if necessary. If vomiting is present, alkalosis may develop and this must be guarded against.

In the subacute and chronic cases, as Burhans and Bigler have pointed out, it is necessary to know whether there is an obstruction to the flow of urine; if so, it should be corrected by surgical means whenever possible.

The various newer urinary antiseptic drugs, such as pyridium, serenium, acriflavine, or hexylresoreinol have not proved as effective in my hands as their introducers had found them.

In my experience methenamine (urotropine) has proved the most useful of the urinary antiseptic drugs. The action of the drug is dependent on the splitting off of formaldehyde in an acid medium. The rapidity of this splitting is dependent on the acidity of the medium and the length of time that it acts. The methenamine, as such, has no bactericidal action at all. During administration, it is therefore necessary to have the urine sufficiently acid so that while the drug remains in the urinary passages, sufficient formaldehyde can be split off to make the urine bacteriostatic. As noted in recent work, this acidity should be at least P_H 5.5. Unless this acidity is reached, methenamine is not likely to prove of great value when administered. The drugs that have proved most useful in rendering the urine acid are ammonium chloride and ammonium nitrate, given in enteric coated capsules if children are old enough to take them, and in liquid form to infants and small children. When there is retention of nitrogen in the body, the ammonium salts should not be used, but instead use of calcium chloride is advised. To prevent splitting of methenamine by the acid of the stomach, the drug can be given in enteric coated tablets.

Methenamine and ammonium nitrate are not to be given for long periods of time without examination of the urine, but the patient should be observed daily in the hospital or the office, and cultures made at regular intervals to determine the results of treatment. The following is an outline of the procedure in the treatment of a subacute or chronic condition.

For a child aged three or four years, treatment should begin with 10 grains (0.65 gm.) of ammonium nitrate and 5 grains (0.30 gm.) of methenamine four times a day at intervals of six hours if possible. This dosage should be continued for three days and acidity of the urine should be tested with methyl red paper; a deep red indicates a P_H of 5.5 or below. After three days a catheterized specimen should be taken, and 0.5 c.c. of the urine should be cultured on an agar plate. If the culture shows that organisms are still present in the urine, the dose of methenamine should be increased to 7.5 grains (0.48 gm.) four times a day and this dosage should be continued for two days when the urine is cultured again. If the plate indicates that bacteria still persist in the urine, the dose of methenamine should be again increased to 10 grains (0.65 gm.), and so on continuing with the treatment until either the cultures of the urine become sterile or the irritation of the bladder produced by the formaldehyde necessitates discontinuing the treatment temporarily. After a sterile culture is obtained it is well to continue with the same dosage for two days, when another culture may be taken and if again the culture is sterile, medication may be discontinued, and after forty-eight hours the urine may again be cultured. If this culture also is sterile, the infection has cleared. If, on the other hand, bacteria are again present in large numbers, it indicates that the formaldehyde has killed off the organisms and prevented growth during its administration, but has not sterilized the urinary tract; the process then must be repeated until the cultures of urine remain sterile after discontinuance of administration of the drug.

It is evident that without culturing the urine it is impossible to determine when it has been sterilized and whether, after administration of the drug has been dis-

continued, the patient has been cured. Culture of the urine is important when making a diagnosis, and still more important when determining a cure.

The most recent addition to the various modes of treatment of infections of the urinary tract has been the ketogenic diet, introduced originally in the treatment of epilepsy. A chance observation led to its use in treatment of urinary infections, in which it has proved surprisingly useful, not only in simple infections, but also in those complicated by anomalies of the urinary tract.

The patient is given about 50 calories and 1 gm. of protein for each kilogram of body weight. For a child weighing 30 kg. (about 67 pounds), treatment is begun with 30 gm. (120 calories) of protein, 70 gm. (280 calories) of carbohydrate, and the balance up to 1,500 calories in fat (120 gm.). The second day the carbohydrate is reduced to 50 gm. and the fat correspondingly increased; the third day only 30 gm. of carbohydrate is given, with a further increase in fat to match the calories; the fourth day only 20 gm. of carbohydrate; the fifth day 15 gm., and the sixth day 10 gm. This is usually sufficient to insure ketosis, as indicated by a strongly positive diacetic acid test, and in most cases a P_H well below 5.5. It may take a few days to bring about this result. If the P_H is not sufficiently reduced in this way addition of 1 to 3 gm. of ammonium chloride a day will reduce it to within the desired range. The urine should be sterile in from five to six days; with the appearance of diacetic acid in the urine a very rapid diminution in the bacteria in the urine is seen. In a number of cases the urine became sterile in forty-eight hours and remained so. This rapidity of cure was observed in the simple cases as well as in those complicated by anomalies of the urinary tract.

It is to be hoped that the dietary measures can be so simplified as to make the treatment more generally applicable in private practice when a dietitian is not always available.

Academy News

AMERICAN ACADEMY OF PEDIATRICS, MEETING OF REGION II

Tutwiler Hotel, Birmingham, Alabama, Thursday, November 17, 1932

Dr. E. C. Mitchell of Memphis, Tennessee, Chairman

Chairman Mitchell.—The purpose of this meeting today is to discuss the attitude of the American Academy of Pediatrics in this region regarding child welfare, with another group of workers in this region equally interested in the subject and to get together at this meeting to exchange ideas. We are very much honored today to have with us, the health commissioners of most of the southern states and of many of the larger cities. I am going to ask Dr. Bishop to open the discussion.

Dr. E. L. Bishop (Commissioner of Public Health of Nashville, Tenn.).—I was under the impression that some one was to precede me and to sound the keynote of this meeting. This is one of the most stimulating and encouraging events it has been my privilege to attend. It has been said by a great leader in medicine that the practicing physician is the most essential arm of preventive medicine. This has been repeated so often and so often quoted, that it has become trite but none the less true. When we see coming together those who are primarily responsible for child welfare and those who represent the public interest, in the protection of child health, when we see that partnership developing with both groups realizing they are each equally servants of the public, we will be successful in the

discharge of our obligations. I have often thought that the pediatrician, in his point of view and in his practice, was more closely akin to the practitioner of preventive medicine than any other specialty in medicine; and the more I see of pediatrics, the more I come in contact with the viewpoint of pediatricians, the more convinced I am of that fact. We have a body of knowledge to apply to the protection of child life and as well, to the protection of maternal life. The holders and guardians of that body of knowledge primarily are pediatricians. The instruments through which the knowledge may be applied more broadly to the individual than it is at present, are public health agencies and practicing physicians.

I have contended that public health work consists essentially of those things which people are not able to do for themselves as individuals, but which require group action. Certain things in the protection of health do require group action: certain things require individual action. The two things should make up the sum of private practice and public health and it is for that reason I think it is particularly encouraging that this group has gathered together for the purpose of discussing problems of mutual interest and for the establishment of some type of organization I trust, through which we may both better serve the people to whom we are responsible.

Chairman Mitchell.—The reason we called this meeting was because we feel that we are fortunately situated here in the south. The Section of Pediatrics of the Southern Medical Association meets every year and at the same time, there is a meeting of the state and municipal health commissioners. We have the same problem in all the states and, we could by some means formulate a plan of action between the two bodies, perhaps including the obstetrician as well because of the prenatal problem, and accomplish something.

The next speaker is Dr. Grulee of Chicago, Secretary of the Academy. (Dr. Grulee's address "The Pediatrician and Public Health," appears in full in this Journal.)

Chairman Mitchell.—It would seem as if we are all cognizant of the problem before us. What we are trying to develop today is a spirit of cooperation with the health authorities. Last summer, Dr. Bishop submitted to me a very practical and concrete plan which I submitted to the Regional Board at the meeting last night. I am going to call on Dr. Davison to submit this plan before we call for a general discussion of the subject.

Dr. Davison.—The Committee has discussed some practical measures to undertake in connection with the public health officers. I think the White House Conference offered a number of very helpful suggestions and, in order to have a working program that would be satisfactory to the health officers and to the pediatricians who would cooperate with it, we felt three committees should be appointed. There should be an Executive Committee consisting of Drs. Garrison, Bishop and Underwood, Strong, Casparis and Mitchell and three obstetricians; to be named later because one of the greatest causes of the high mortality in the south is associated with birth. Whether it is the field of obstetrics or pediatrics which is at fault, we do not know. The second committee would be on "What to Do," how to work out a definite and concrete program, consisting of Drs. Parrot, Draper, Hayne, Weston, Royster and myself. The third committee would be a committee on Publicity to get this definite program before the medical profession, consisting of Drs. McCormick, Anderson, Baker, Halloway, Walker and Leslie Moore. Both of these last two committees would also have functions to be named later.

The idea is, that the three committees will be appointed, will elect a chairman and work out the program, and the Executive or Planning Committee will see that the program is put into effect. I should like to make this recommendation as a motion. (The motion was duly seconded and carried.)

Chairman Mitchell.—I should like to hear from the Health Commissioners who are present whether they think this scheme is practicable and how they think we can best work it out and any other suggestions they have to make. I should like to call on Dr. Baker.

Dr. J. N. Baker (State Health Officer, Alabama).—I was a practicing physician until I took up public health work and throughout my professional career, I have been primarily and fundamentally interested in the problems that now confront organized medicine. I think both pediatricians and public health workers will find a very particular appeal in an opinion expressed by some authority who used these words, "Give me a child for the first five year of its life, and you can have it for the rest of time." If all the available knowledge concerning the prolongation of life and the reduction of mortality were rigidly and completely applied, the span of human life could be increased by some ten years. This means that a great deal of available scientific knowledge which should be applied is not being used; and I think, to borrow an expression from Dr. Bishop, the challenge to the organized profession is that we make available all such knowledge to the general public so that the span of life may be increased as far as it is humanly possible.

One question which agitates the organized profession, a great deal over the country, and a little bit in the state of Alabama, is the encroachments that are being made by public health workers on the prerogatives throughout the years, of organized medicine. That is quite true, and yet most of the encroachments that are being made by the general public through the public health workers have been forced, as a demand for such a service to the general public. Take for illustration, the development of the tuberculosis problem throughout the country. Who were the prime movers and initiators of the forces that led the battle against tuberculosis? It did not originate within the medical profession. The public conscience developed to such a point that it demanded a service and, do you know, in most of the states of this union today, the tuberculosis programs are sponsored and railroaded through, not by organized medicine, but by lay activity which puts them into effect and we follow up the rear.

The point I want to make is that this group of all groups realizes more than any other, the great importance of organized medicine, thinking in terms of a preventive and constructive program and not in terms of an individual and curative program. Therefore, the problem that confronts us is the formation and creation of proper leadership that will direct the lay forces in the proper channel. It was fail in that, I fear organized medicine really stands in jeopardy. My interests are first, last and always in the tradition of organized medicine, but I do feel that we have problems confronting us today such as have never confronted organized medicine before and it is up to this group, starting with the infant and coming up to where you can help to crystallize the thought and the leadership for your various communities which are represented. It is not right when you know that a baby can be protected absolutely against smallpox and against certain other things, to permit that child to go through pre-school age still unprotected against infections of that sort. It is up to organized medicine and the doctors to protect that baby in the proper way; and, until we do that, until we recognize our responsibilities and shoulder them and furnish leadership, we are not discharging our full duty toward the people as a whole. Rest assured, if we do not furnish it through the proper channel, the public will create those channels whereby the service will be rendered them, and that channel may not be so acceptable to the mind of the profession. That is the thought I wish to leave with this group, and I am particularly glad I have had a chance to present my views to one group I feel has more power probably than any other in organized medicine.

Dr. A. T. McCormack (State Health Officer, Kentucky).—No division exists between the pediatrician and the public health officials of Kentucky. The Health

Department is controlled in all its policies by the organized medical profession. I happen to occupy the position of State Medical Secretary as well as State Health Officer and my position of State Health Officer is dependent upon the medical profession of the state. Consequently, they control all our policies and all our motives.

It seems to me, in the consideration of this tremendously important problem, we should attempt to take the enormous mass of information that was gathered together at the White House Conference and boil it all down to the fact that the desire on the part of these two branches of the profession and of the profession generally is to preserve normality where it exists in every baby that is born and to acquire it, as nearly as possible, in every one that devites from that normality. It is perfectly apparent to every practicing physician that can be done in regard to any particular baby only by the individual examination and care of that baby. Wherever that is not attained, we are not going to get results; and for that reason, the main measuring-rod by which we determine the efficiency of the County Heauth Department in Kentucky is whether the physicians of the community it serves, report a larger number of office visits and a constantly increasing group of people coming into the offices of the doctors for individual examination and care. In return for that, we have a right to expect, as we are teaching our people to consult individual physicians for their individual conditions, the cooperation of the physician in doing all those things we now know are necessary to the preservation of as near normality as possible, in each individual family that is dependent upon that practitioner.

I was glad Dr. Grulee brought out the fact that we have had vaccination for years and it has not been getting anywhere. There is no other procedure that is done in a more haphazard way than vaccination. There is no medical school in the United States that teaches this most important, most universal of all surgical procedures with any accuracy or any care, and today in the majority of instances, it is being done just as badly as it was when Jenner died. That is a fault to be laid primarily at the door of the medical profession. In a group like this, it might be an outrage to ask how many of you have vaccinated your children when they were six months old. How many of you have inoculated them for diphtheria when they were six to nine months old? I have asked that of every medical society in the country, time after time, because we are trying to meet the responsibility, and they won't do it unless they do it on their own children. We are doing something in regard to scarlet fever, in which we have made tremendous progress. Dr. Jones, our epidemiologist, in connection with the County Medical Societies of the state, has inoculated personally some 30,000 children for prevention of scarlet fever, and the physicians of the state have reported some 36,000 inoculations they have given. We furnish them with the vaccine free. We make it ourselves and furnish it free in order that this may be accomplished. We are making a study of it jointly with the State Medical Association so that our report, when it is given, will have the force and effect of the combined and best opinions of the medical profession of Kentucky. The reason we haven't enforced vaccination in the United States today is because it has not been done by us, as doctors in our profession. There is no compulsion in law going to make the entire population do anything. The thing we should do is have a tickler for every different year's clientele and notify the patients when to come in for these important procedures. We look forward to seeing the time come when the physician in charge of a baby, who has failed to vaccinate it for smallpox or failed to protect it against disease, for which we have definite protection, will be liable for malpractice in a far greater sense than he is for any of those acts of carelessness which now constitute legal malpractice. I think the most important thing we have ever done since the Southern Medical Association has been organized, or since the Conference of State Health Officers

has been organized, is this gathering together of you who have the mass of scientific knowledge that should be made available to every family in the south that we may work together to that end.

During this intermediate period you must remember that a large number of the profession will not vaccinate the members of their families, they are not going to inoculate them against diphtheria or scarlet fever, nor inoculate them for typhoid fever at the proper time. If these children go to the state schools and are thrown together en masse, the profession has failed to do its duty. We expect in Kentucky, under the direction of the Medical Association, to protect every child that comes to school. We realize that we have already had more than 75 per cent of our deaths before they reach school age and that these can only be saved by the family physician. We propose to protect that other 25 per cent and get a definite provision that applies to our school system for these unnecessary deaths; and we propose to carry through those procedures in the name of the state for the children we force to come to school and to take these unnecessary risks. Since the profession is able to assume its part of the responsibility, we are trying our best to drive people into the doctors' offices, in every county in the state, to get this necessary protection. As we promote the practice and bring to the doctor every single baby and from babyhood have them in the doctors' offices, as rapidly as the profession is willing and able to care for them, we will have solved this problem; and it seems to me that today in this gathering, you who are occupying the far advanced position in the practice of medicine, are far out on the scout-line, away ahead of most of the other branches of medicine.

As we gather here today, with your outlook, your knowledge, your science, we are able to strengthen your hands by public support and public recognition and public propaganda and it is our job to do that just as far as we can; to strengthen you and get more and more of our babies under your control and more and more of our doctors to come under your supervision, direction and instruction.

Dr. C. W. Garrison (State Health Officer, Arkansas).—Dr. Grulee laid down in his paper many fundamentals upon which we can all stand. Dr. McCormack and Dr. Baker have set out very clearly but briefly, the problems that confront us all. The policies which Dr. McCormack laid down are the policies in effect, in all of the southern states, not as effective possibly as they are in Kentucky, but we are all striving to that end. All I want to say now is that I think we do owe to Dr. Mitchell a debt of gratitude for conceiving and promoting this meeting here today which will bring about a closer understanding and cooperation between the members of the medical profession and the health authorities, which is the essential thing for the attainment of what we are striving for.

Dr. Felix Underwood (State Health Officer, Mississippi).—I congratulate this group, and when I say "this group," I refer to the pediatricians, upon not only realizing there is a great problem to be solved, but in boldly announcing to the world that you intend to do something about it. As was stated, the pronouncements of the White House Conference were rather general. There were many splendid outlines, much splendid work done, time and thought devoted to it, but we must settle upon a definite and specific program and carry through. It seems to me in rural Mississippi, and we have other rural states in the south, where pediatricians are few and far between, that the job will be somewhat harder; but any pediatrician in a county, even one in a county of 30,000 or 40,000 people, with twenty-five or thirty doctors, it seems, who has this thing so much in his heart, could go before the medical group, could see them individually and collectively, and do so much more than the health officer, because there are physicians who feel that and will say, "Well, that comes from the Health Department, you know; it is something to go over." If the pediatrician of the ranks, doing private practice, would sell the physicians of his community, his town, his county, the idea that this work in child

hygiene must be done and done right, we would be getting somewhere. Of course, we understand the importance of prenatal work, but until every doctor doing obstetrics develops a real obstetric conscience and until the mothers are informed, we are not getting very far.

The field of mental hygiene of course has not been touched, nor the immunization work that is so very important. Less than 25 per cent of our school children in Mississippi have been immunized against diphtheria. I should think that at least 80 per cent of all children are without immunization. We have, as I say, few pediatricians. We have fifty-three counties with no organized public health work at all. It does seem that with 80 per cent of this work not being done, the field is in great need of being strengthened at this time. I am so very glad this came from this section and you will certainly have a most friendly cooperation in every way. I believe we have started something here that will gather force as the months and years go by and, in a reasonable period of time, this great bugaboo we have been shying around will be solved and we will be driving straight through to the goal we so much desire.

Dr. W. F. Draper (State Health Officer, Virginia).—In Virginia, we have been making the most earnest and persistent effort we have known how to bring the physicians and health authorities, state, municipal and local, into a close cooperative partnership. We have started a diphtheria program because that seemed to be the easiest thing to start with. We feel if we could lay a basis, a foundation for cooperation in this one particular thing, we would have something we could develop and carry further along other lines.

I want to take up one subject for only a moment. We had in Virginia last year 225 deaths from diphtheria out of 4,641 cases. The Health Department was besieged on all sides to do something about the matter and we felt it was our duty to do something. We went to the State Medical Society with a program whereby we agreed to have our health officers and our public health nurses carry out an educational program in every county in the State of Virginia, among the people, to advise them as to the diphtheria situation and as to what could be done through immunization toward preventing the spread another year. We also undertook by visiting the families in the counties, to bring the children together in schools in considerable groups and to arrange with the physicians to immunize these children. We felt that the physicians were best qualified to judge the ability of the different people to pay and the amounts they should pay. The program was carried out and the charges for immunization in considerable groups varied all the way from 35 cents to $2. We succeeded in securing, through these means alone, about 55,000 immunizations last year. That program was all right for a start but it is not satisfactory and definite. In one county it was very thoroughly carried out by the public health authorities. They visited the homes of all the 150 school children who were not immunized for diphtheria, trying to persuade those people to come in and permit the doctor to immunize them. The parents of only 34 of these children indicated any desire for immunization because the charge was $2. However, the educational work was very thoroughly done. The other children were not immunized because the group was not large enough to make it worth while for the doctor to come there and give the three treatments at the price that was established. This year at the opening of school, an outbreak of 64 cases of diphtheria occurred in one school. The Grange of the county, a very powerful body, had a meeting and decided that the children in this community should be immunized by the health department right away, since the children had not been immunized by the physicians of the county, because the charge was more than most of the people were prepared to pay. A resolution was adopted which was sent to the County Board of Supervisors stating the members of the Grange did not desire the physicians of the county

to dictate the policies of the County Health Department, as they did not feel it was their duty and they would like to know what the Health Department of the State would be willing to do in the emergency.

Here we have a great public sentiment all around us in the county. They feel that the physicians have had a chance to do something about the matter and their program has not worked out and they want us to come in and do something. What I propose to do is this: I am going up there and meet the members of the Medical Society; I am going to tell them just exactly how the matter stands. I am going to say that those children must be immunized but I think the best way for them to be immunized is by their family physician and that we will do everything we possibly can to get the immunization work done by the family physicians. I am going to tell those doctors we will allow them a period of perhaps eight weeks or so to communicate with those families and endeavor to persuade the parents to send their children to their private physicians; and at the end of that time, those who have not been immunized will be immunized by the Health Department. I think in this particular instance, the Health Department has even gone so far as to compose a letter to the parents of the children in the various counties, to be signed by the physicians, telling the parents of the necessity for immunization and advising that the children be brought to a physician for that work. Physicians have signed the letters and have sent them out. I do not know how we can do more than that.

It seems to me that the whole proposition, so far as immunization and many of the other things are concerned, is rather a simple one. I cannot, for my part, understand why the physicians cannot make it just a routine measure to immunize children at the age of six months, as to cut the cord and, if the child is delivered in a hospital or by a specialist, I do not see why it cannot be made the responsibility of the person who attends the delivery of the child to see that the family physician in attendance on that child does carry out his proper duties. The Health Department will undertake to attach to every birth certificate a sign showing that the child was immunized at the end of six months. The Health Department will undertake to send to every family, when the child is nine months old, a postcard asking, "Has your child been immunized against diphtheria? If not, why not?" Now, it seems to me that this society should use its influence to have that procedure adopted as a regular and routine measure and if so, we would make a mighty good beginning toward solving our problems.

We fuss about clinics among school children and preschool children, all of which would be entirely unnecessary if the physicians themselves could just work with us to do the things at the time they ought to be done. I know that this will work because some of the doctors have told me when our campaign started last year, they did send out letters to every family in which there was a child under their care and one doctor, in general practice, said he had immunized 114 children as the result of this appeal. He told the families in his letter, to bring the children and if they could not afford to bring them in, he would immunize them without charge. He told me that only three had been without means to pay something.

I am tremendously encouraged by this meeting. I think a great deal can come from it and I want to assure you that all of the health authorities I know have been doing their utmost to bring about this kind of understanding.

Chairman Mitchell.—It seems the health authorities have certainly expressed their willingness to cooperate in every way. The Academy, as I understand it, was organized for the purpose of furthering child welfare. We have a national organization, a regional organization and an organization for each state. It would seem that would open great possibilities for work if properly carried out. We have appointed these committees jointly with the health authorities and the obstetricians. These committees are appointed in regions where the men know each other and therefore will be convenient for meetings and we hope these committees will be active.

Dr. J. H. Mason Knox (Director of Child Hygiene, Maryland).—I can add nothing to what these experienced health officers have said about their great desire to cooperate with the physicians in having them do everything they can on the preventive side. In going over the death certificates of children who have died in Maryland, rural Maryland particularly, in a year, it is perfectly amazing to see the number of certificates that have been signed by physicians who have been in attendance only within twenty-four hours of the death of the child. That I think is a tremendously important phase of the subject for the practicing physician to consider. Those people are largely poor people, many of them colored people, and the medical profession is not reaching them for anything like preventive care. That is the only excuse for the Health Department to come in with anything suggesting clinics or child health consultation. If these committees you have appointed, through influence upon the medical profession, the local medical profession and various rural areas, I am speaking particularly of rural areas throughout the South, can devise some scheme by which the community, through its medical and practicing physicians can offer as the right of citizenship, medical examination and preventive care for every young child in the community, I think most of our troubles will be over. Certainly no health officer would do less than applaud such a movement. Until that time, and until we have such a situation as we have been describing, where, because of poverty and because of ignorance, children who were supposed to be well are not willing to be and are not taken care of through medical supervision or examination, we know we will have this large existence of unnecessary deaths. That is the problem in Maryland, as I see it.

We are meeting it in a few of our counties by having the physicians from each of them, in their own offices, give an hour a week when they will receive people who cannot pay for their services, when they are sent to them by public health nurses, the Welfare Association or any other organization. If the physician feels that those people can pay even anything, they are at perfect liberty to charge whatever they think they can get; but at least it does take away the excuse of poverty and I think that is an important thing. The large death rate in our rural areas does not come from people who are going to physicians of course; it comes from the people who are not. The great reason they are not coming is because of ignorance and because of their inability to pay. Can we not then as practicing physicians, interested in the welfare of our respective communities, place at the disposal of all our people irrespective of race and pocketbook, some method of preventive pediatric care?

Dr. Horton Casparis, Nashville, Tenn.—I think all these things we have been talking about have as their basis, education. There is one obstacle to this education that I do not believe is stressed enough and that is to teach people that the $1 or $2 they pay for immunization gets them more than they ever got from spending $1 or $2 for anything else. They do not hesitate to spend $1 or $2 for material things. I do not believe we have stressed enough the value of health, the value of paying for health and the value they get for the small amount they pay for health. This cannot be done very well by the physicians themselves, but it can be done by health organizations.

Dr. Jacobs, of Memphis.—There is one point I think is of primary importance in considering the immunization of children. I was very much interested in what the health officer from Virginia (Dr. Draper) said and I understood that if the family physician or pediatrician could not or did not, after a certain length of time, immunize the child, the Board of Health would. I have met with this difficulty. It is not always a matter of the cost of immunization; a great many people strenuously object to immunization and will not permit it either by the family physician or the health officer. I realize you can hold them to this when it comes to vaccination against smallpox. You can rule them out of school and not permit them to enter

school unless they are vaccinated. What can be done with parents who refuse immunization against diphtheria? I have found them to be in quite considerable number.

Dr. Hill, of Knoxville.—It seems to me that the members of the Boards of Health, especially the gentleman from Virginia (Dr. Draper) have laid out a very complete indictment against the medical profession. They are forced into the position of being our immunizers. Dr. Knox told us that in Maryland in an amazing number of cases, the death certificates show that the physicians were called only a few hours before death. How can we help that? It is the province of the Boards of Health to educate the people. The difficulty Dr. Jacobs mentioned is very common. I have yet to see any physician decline to do any measure of preventive medicine because the people have not the money.

We have a plan in Knoxville, where Dr. Innis is the Health Commissioner, that any patient who was not able to pay for immunization could come to his physician and be immunized free of charge. One hundred and four physicians in the city signed an agreement made up in the Knox County Medical Society that, when families not able to pay brought a certificate from a charitable organization to their physician, he would give them immunization free of charge. I cannot conceive of a whole county of physicians declining because the people haven't money, to give whatever preventive measure is necessary or available. I can assure you that you will receive absolute cooperation in any preventive measure so long as we all keep within our province and right.

Dr. Weston, of South Carolina.—I do not see how I can escape being encouraged. I think if the American Academy of Pediatrics takes no further stand than to coordinate and cooperate, it is great; because, with our meeting here today and the one held last night, we have more than justified our existence.

After this inspiring meeting today, if it does not bear abundant fruit it will be because the men who have been placed on these committees have not considered the seriousness of the obligation they have undertaken in preparing a program so comprehensive in all its phases of cooperation and coordination.

We might as well realize in our intense individualism, we have not given the splendid men who are conducting these departments of health our fullest cooperation. It has not been a lack of knowledge, nor has it been a lack of opportunity. It has been this intense individualism which has prevented cooperation. We have reached a point in the philosophy of government, as a recent candidate for the Presidency has expressed it, by which that cooperation must come into play if these great American people are to be preserved. It is the task of those names on the committees to bring about a spirit of cooperation, a practical cooperation that will solve this problem.

Dr. Sidbury, of North Carolina.—There is only one point I wish to present for consideration and that is in regard to the willingness of the pediatricians to cooperate with the health officers. I have talked this over with Dr. Cooper of North Carolina. The health officer should ask each pediatrician in his particular section to meet with the Parent Teachers Association or a high school or some unit like that and educate the people as to the value of diphtheria prevention. Such a policy could be carried over each year by the Health Department as an effort on their part rather than through the individual physician. They could ask Dr. Smith to go to a certain place and talk preventive education and preventive health measures as to diphtheria and smallpox. Each year the message would be more effective. That is one thought I would like to have the health officers consider and see what their reaction is to it. Dr. Cooper thought very well of it and it seems to me that is one way of getting across the campaign of education in regard to children who do not see a physician until they are sick. But they do go to schools. If they can

get these country people who go to these schools and have a definite message of preventive medicine carried to them, I believe it will reach a greater number of people than in any other way possible.

Dr. Royster, of Virginia.—I do not know whether I am a pediatrician or a public health man for I have devoted a part of my life to each of these activities. There are three very bright spots in my professional career; one of these was when the pediatric section of the Southern Medical Association was formed. The next was when the American Academy of Pediatrics was formed. The third, and brightest of all, is this meeting today. I see promise in a cooperative meeting of these two groups for without exception, the home, the safety and health of this nation, and this section of the nation, depend on this group right here. Unless preventive medicine is practiced in childhood there is not much use for preventive medicine.

I believe this cooperation existed for some time. Unfortunately, it is not so much the pediatrician as it is the general practioners who need educating just as much as the public; because, as one speaker has said before me, from the laity came the demand for concerted action against tuberculosis and not from the profession. As pediatricians we must be leaders in thought though we are not specialists. It is a wrong conception that we are specialists at all: we are general practitioners applying our knowledge to an age group. Pediatrics has for its object the making of the best adult population of the next generation out of the material presenting itself to us in childhood; that is our aim and our object.

If this group of men here today make up their minds that this thing is going over, it is going over. Some one spoke of the committees a while ago. I do not see that this is all committee work. Not one-tenth of it belongs to that committee. It belongs to all the rest of us.

We have, as a profession, in some measure lost the confidence of the public. There is no use denying it. Sinister motives and influences have come to cast reflection on us as an altruistic body and only too many people look upon us today as a scheming body. We might as well face the fact that we have got to recreate in the minds of the public a confidence in us that we have their welfare and the welfare of their children and the health of their communities at stake.

Dr. Annie Veech (State Board of Health, Kentucky).—I have been in public health work for children, now for the past ten years. I would like to say that in my own state if it were not for the fact that the obstetrician and the pediatrician hold up our hands we would not have been able to accomplish anything in that time. I feel that the work of the Department of Child Health in our state should be and is entirely educational. If for a time, we have gotten into the child conference program, ultimately that work will be entirely for the indigent, because the profession all over the state is ready to meet the need of the well-to-do. We might have had ideas there would be public health workers enough to take care of all the children and instruct in these matters but we are all convinced that this is a thing of the past. It is up to the private physician to look after that. Our work is a work of education.

The thing I would like to appeal to the profession for is this, that you give to us child health workers minimum standards of child health and minimum teachings, that the simplest kind of a mother may understand, to replace old wives' tales. That is what we have been trying to do. What I keep insisting on to the pediatricians is that I may bring to the public and to the profession only the minimum facts related to child health. I think that can be a big contribution. Teach us all, the general practitioner and the health worker, what we are to teach the public. In my own state, during the year before the last and again this year, we are carrying to the general practitioner in rural areas, courses in obstetrics.

That is what I want our pediatricians to do for me. I want to be able to take pediatries to the man who cannot get away from home and learn modern pediatric care; and, when I say "pediatric care," I do not want him to teach just how to take care of the sick child, but I want him to bring to these rural men, who have not the chance to get away, a knowledge of the well child. I think those are the important things. I do not want you to forget that the pediatrician is the person whom the person dealing with child health is dependent upon.

I am very much pleased that these two groups have been brought together, for I know that the men all over the South will help hold up the hands of the public health workers for little children, just as our men do in Kentucky.

Chairman Mitchell.—I hope this meeting will really bear the fruit that it appears it may at the present time. I am sure we had a much better meeting than I anticipated. In behalf of the Academy, I wish to thank the health officers for meeting with us; and, as I said before, the Academy is going to do all it possibly can. I am sure the health authorities will. As fast as these committees do anything, we will make it public to each member of the Academy. I want to emphasize further though what Dr. Royster said, that it depends on each man present here, as well as on the committees.

Immediately following this meeting, I should like to have the members of the Academy stay for a short business session.

Business Session

The Colonial Room of the Tutwiler Hotel, Birmingham, Alabama, Thursday, November 17, 1932, 3 O'clock P.M.

Dr. E. C. Mitchell, Chairman (presiding)

Chairman Mitchell.—The meeting will come to order. The purpose of this meeting is to determine if possible, the policy of this Region in the future. We have had no definite policy as to a meeting place and the type of meeting we wish to hold. We will now open the meeting by asking for suggestions from the members as to the future policy.

Dr. Weston.—It seems to me, that this can be better determined after the committees that have been selected have an opportunity to work out their various programs and report to you and you in turn to the members of this Region.

As to the place of meeting and time of meeting, it seems that might as well be worked out in connection with our section meeting at the Southern Medical Association, because I presume that practically every member of this Region of the American Academy of Pediatrics is also a member of the Section on Pediatrics in the Southern Medical Association. I do not believe it would be wise to multiply the number of meetings. In view of the fact that our section meets in the morning for one meeting and in the afternoon the next day, it might well be sandwiched in without inconvenience to anyone or disturbance of the program of the Southern Medical Association.

Chairman Mitchell.—A great many men, in correspondence with me and in talking with us, have asked me, "What does the Academy offer me?" I think after the splendid meeting we had a little while ago, we can see that the Academy really has a purpose. I think that the primary purpose of the Academy was, as I said before, to further child welfare. We have a definite aim and we have started something that should prove of great value. The question has always been brought up by some, "Shall there be a clinical session of any kind in connection with the

Academy?'' and either clinical round-table talks, papers or what. Some seem to wish it and some do not. That is the expression in particular I should like to have this afternoon.

Dr. Davison.—I move that Region II have a dinner on Wednesday night of the meeting of the Southern Medical Association, followed by round-table discussion that evening.

Chairman Mitchell.—Is there any discussion?

Dr. Rosamond.—I think Dr. Davison's suggestion is a good one for the reason that the program of the Southern Medical Association next year, as outlined by the Councillors, will be of the same type as the one this year, namely, the first day taken up by clinics by local men, the second day a general session and Wednesday for the section meetings. Motion duly seconded and carried.

Chairman Mitchell.—One other point I think should come up before this meeting. I have a letter from Dr. S. McC. Hamill, which I will read:

''November 15, 1932.

''Dr. E. C. Mitchell
''Hotel Tutwiler
''Birmingham, Alabama

''Dear Dr. Mitchell:

''I wish I might be able to attend the meeting of the members of the Committee of Region II when they convene in Birmingham Thursday of the present week. Won't you please extend my greetings to those who assemble and my best wishes that the meeting may be very successful and far-reaching in its results.

''It seems to me that the Academy has a great opportunity to contribute much to the upbuilding of pediatrics and especially to the developing of a broader and more effective interest in all publicly and privately supported health agencies. This is an age of cooperative effort and we are not going to render to the child the service that is due him until we have learned to work together.

''The realization of this hope depends altogether upon the willingness of the state committees to play their part in this program. It is very encouraging to the Executive Board of the Academy that a number of the states have already organized effective committees, outlined programs and are engaged in putting them into action. I sincerely trust that Region II will do everything in its power to stimulate the completion of state organizations and the building of their programs.

''The more intimate one becomes with the Academy and considers its purposes, the more one becomes convinced that when the country is fully organized we will possess one of the most potent institutions for the furtherance of the protection of the health and welfare of children that exists in the country. I trust you are all imbued with the same belief and that each year you will do your utmost to realize its possibilities.

''With kind personal regards, I remain,

''Faithfully yours,

''(Signed) S. McC. Hamill.''

Chairman Mitchell.—There is another thing we should do today and should always do in our business meetings, that is to hear individually from each state chairman as to what is going on in his state. I am going to call on the state chairmen who are present to give a brief report for their respective states.

Dr. Lamar (Alabama).—It so happens that all the members of the Academy in Alabama are located in Birmingham. We have had several joint meetings and discussed the question of sending out application blanks to other pediatricians in the state; we have been rather waiting for this meeting to outline the purposes of the Academy before we made any active approach for members. We are following up the White House Conference through the efforts of Dr. J. D. Dowling, health officer, who attended that conference and is helping to carry out those ideas. We have done nothing beyond that. We have an active State Society that meets with the state organization. I do not know whether that explanation is sufficient.

Chairman Mitchell.—Is your State Society known as a branch of the State Association?

Dr. Lamar.—As the Alabama Pediatric Society.

Dr. Grulee.—May I ask what they are doing in the way of follow-up of the White House Conference. Are you in any way consulted as to its measures or have you anything to say about the work being done for children there?

Dr. Lamar.—We have been very much in accord with Dr. Dowling and he has consulted us individually but not as a group. We have been entirely in accord with his work. As a matter of fact, we have been quite proud of his work.

Dr. Grulee.—May I suggest that he detail to me, as soon as he can, the work that is being done in the state to follow up the White House Conference? We are very anxious to get such material and have it on file. I have that for a few of the states but I haven't it from all and we want to know what is being done in each state, how it is being carried out, and what personnel they as individuals or as groups, are putting in it.

Dr. Buckman (Florida).—The work in Florida has been related mainly to organization. We have embraced practically all the men in Florida from Key West to Pensacola, with the exception of two. We hope to have them in the Society soon. That is the extent of work that has been done.

Chairman Mitchell.—Have you a State Pediatric Society in Florida?

Dr. Buckman.—Just an immature one, but it is growing.

Dr. Roberts (Georgia).—I believe there are only 60 members of the Academy of Pediatrics. I have seen personally practically every pediatrician who is a member of the State Society of Georgia. First of all, they want to know just what this organization means to them and many of them have said as soon as they are able, they wanted to come into the organization. At present, financial trouble seems to keep a great many men out.

The White House Conference Committee in Georgia has been meeting with various child welfare organizations. It was held in connection with the State Board of Health one year, with the Georgia State Medical Association last year and it has also been held along with the organization for the neglected and handicapped child. I believe that is the policy for the future. I have had several conferences with the head of this organization and we are planning a meeting for spring in Macon, Georgia. I think we will be consulted and probably they will be guided very much by our wishes in this meeting.

It might be of interest to state, before my appointment as state chairman, there was a study of maternal and infant mortality in the state made by the Georgia Medical Association and of this committee I was appointed chairman. At present we are working along that line and we believe it will be a matter of tremendous advantage to us to know what the situation is in our state and how we can best put across educational measures. We are planning during this year, in fact it is well under way now, to hold meetings with our Parent Teachers' Associations throughout the state wherever meetings are planned. We are trying to put across preventive measures for infant mortality.

We have an active Georgia Pediatric Society, that is aiding considerably in our present study of infant mortality. I might state further that we have had many conferences in the past two or three months with the social agencies in our state. We should be interested in child welfare, not only in the health of the child but in the sociological phase also. I was amazed to find how ignorant I have been of legislative measures for the care of our dependent, delinquent and handicapped children. I am ashamed to say that Georgia is far behind in many of its legislative programs. I think all of us should know very definitely what is going along in these lines and I believe we can be of tremendous help to the organizations which are trying to put over proper legislative measures. I find for example, in our state at present there are thirteen very vital legislative measures that have been in process of getting through our Legislature for the past ten years; and it seems to me that a group of our type could help in putting across these measures. They are not directly health measures but indirectly they are and I think we should certainly consider that phase of our work. I believe it is very important.

Dr. Bruce (Kentucky).—In regard to the White House Conference in Kentucky, I will say that the Governor of the state appointed the President of the University of Kentucky chairman of the Follow-up White House Conference and Dr. Barbour was today appointed as Chairman of the Medical section, and then he appointed a chairman for the Educational and Social Department Service Section. There was a very stimulating meeting last month in Lexington, at which some five or six hundred people were present. We had a very fine program lasting a day and a half, giving half a day to each of those divisions.

The work has been carried on throughout the state under the direction of Dr. Hand, who was to be present today and speak to you; and a committee known as the White House Follow-up Committee has been appointed for each county of the state. Each committee is made up of one doctor and three prominent laymen. The Academy hasn't had a great deal to do with the work because it was already being done very efficiently by the agencies I have mentioned.

There are only seven pediatricians in the state and they are all in the city of Louisville. There are only four of those who have been in pediatrics long enough to be eligible for membership in the Academy. Two are already in it, and two have applications on file now. I would like to ask in this connection what is the policy of the Academy about men in the smaller places, who are not limiting their work entirely to pediatrics. There are several men in Lexington for instance, a city of thirty or forty thousand people, who are doing some pediatric work but they are also doing a general practice. I know of no physicians in the state except those in Louisville, who would be eligible for membership because of the rules of the constitution.

Chairman Mitchell.—Dr. Grulee, will you answer Dr. Bruce's question?

Dr. Grulee.—All I can say is that it has been the custom of the Executive Board to liberally construe those ideas put down as necessary for membership. If a man is in a small community, where it is impossible for him to exist on a purely pediatric basis, as it is in many communities and the communities differ with the education of the group of people he is working with, we have been inclined to take the word of the man in his community regarding his fitness for membership in the Academy. In other words, the fact that he has a general practice does not keep him out.

Dr. Strong (Louisiana).—We have in the State of Louisiana an active State Pediatric Society which has been in existence now for more than ten years. The meetings are held annually and our membership is now rather liberal and not confined entirely to the men doing pediatrics exclusively. I think we have something like forty members. They usually meet in connection with the State Society but they function as an independent organization.

The machinery for following up the White House Conference in the State of Louisiana is provided for but largely before the Academy yielded as much influence as it now does. Mr. Griffith of the faculty of the Louisiana State University, was appointed State Chairman by the Governor of the state and a meeting was held in Louisiana State University at Baton Rouge. It was held about a year ago and Dr. O'Hara, President of the State Health Department functioned as Chairman of the Medical Section. The meeting lasted two days and the different activities of the state for instance, the Child Health and Welfare Association of New Orleans were represented. It met at the same time as the State Teachers' Association.

Dr. Womack (Mississippi).—At the time I was appointed chairman of Mississippi and Arkansas, we gave certain men in Arkansas an opportunity of becoming members and that is under way at this time. We have in fact, now three men in Mississippi who are, or who will soon become members. We have at present under consideration plans with the State Health Commissioners whereby child welfare programs will be put on during the next year in every hospital. That is being discussed at their regular staff meetings. They have one meeting during the year and the child welfare and pediatric program will deal with child welfare. We have also under consideration a program whereby we will have either the city physician or the State Health Officers aid child welfare work in an educational way purely. Many of you heard Dr. Underwood, whose ideas as to the educational phase of child welfare coincide with mine. We are in agreement on the extent of the work we should do and that is through cooperation, purely educational work with pediatricians first and also the general practitioner and the lay people. They should be educated as to what the Academy will offer and we hope a plan will be outlined either in this Region or in a state, as to just what the actual work should be. We had a State White House Follow-up Conference over a year ago, which was well attended and carried out the ideas as far as our state organization could, at that time.

Dr. Sidbury (North Carolina).—We have a North Carolina Pediatric Society of twenty-five members and we hold about three meetings a year; a joint meeting with the State Society held just before the Southern Medical Association meeting, one in the summer and one in the fall. We had one meeting at Duke University with a very excellent clinical program, and last August we met at Roaring Gap with Dr. Butler, who is in charge of the Roaring Gap Hospital. Dr. Grulee was a guest speaker at that time and we had a very enjoyable event.

We have admitted to our Society, sticking to the letter of the law, only those of five years' pediatric work.

In regard to the White House Conference, we are very much in the same position as a number of the others who have reported. We have had some work, such as orthopedic work which was being carried out before we started, which we are continuing. We also have a Section of the North Carolina State Medical Society which has a session consisting of papers and clinical work just as we do here; so we have two pediatric organizations functioning in our state.

Dr. Waring (South Carolina).—We have a very small membership in South Carolina. I should say our activity has been confined chiefly to an attempt to secure new members. There has been a Follow-up White House Conference in Columbia and so far, no great activity has resulted from that. There is a State Pediatric Society which meets independently of the general State Society. This Society is interested in the subject of infant mortality and has recently offered a number of speakers to the various county medical societies.

Dr. Lesesne Smith (South Carolina).—I attended the White House Conference Follow-up in South Carolina. Unfortunately, the powers in charge were appointed by the Governor and for purely political reasons. We had an enthusiastic meeting but, as the rulers were all politicians, we ended right there and are doing nothing now. The women of the South Carolina organizations are clamoring for the follow-up work and there is plenty of enthusiasm in regard to the work that the White House Conference should do; but we have been sidetracked.

Dr. Casparis (Tennessee).—In Tennessee we have a State Pediatric Society which is not limited to pediatricians. It has been our feeling that if we can get general practitioners who have children to care for into the organization, we may have some influence in helping them along in their work and in their contacts which they have with children. I do not know exactly how many members of the American Academy we have in Tennessee but we have a good many pediatricians who are not members at present. There has been a good deal of cooperation between pediatricians and the State Health Department. The Health Department has requested some of us to talk to county medical societies and various medical organizations, in an attempt to promote the ideas which have been expressed here today. The State of Tennessee Conference for Child Health and Protection, which was appointed by the Governor as a follow-up committee on the White House Conference, has recently been formed and at a recent meeting, a variety of committees were appointed. These committees are working at present and are going to bring their reports together at a joint meeting, which will include not only the various members of the State Conference but local committees in nearly all of the counties of the state. This joint meeting will be next Sunday, Monday and Tuesday. That is about as far as we have gone in connection with the follow-up work of the White House Conference.

We are trying to work out some practical recommendation, which will have an influence along the lines we have been talking about today. The organization is chiefly political and I think there are only two or three doctors on the committees. Fortunately, Dr. Bishop has had an active part on the committee and one or two others, who have had experience and know what the needs are and what can be done for the children and will try to exert some influence to see that something is done and not let the step die after the peak of enthusiasm has passed.

Dr. Stone (Virginia).—The follow-up of the White House Conference took place last fall, and we secured a good deal of interest in a program of child welfare. At the present time, we have some tentative plans for sponsoring what might be spoken of as an educational program. As Dr. Baker mentioned in his talk, one of the big problems we have is a certain amount of indifference on the part of the general practitioner in regard to routine health examinations and preventive inoculations. We propose to work with the existing organizations in the state, which have as their object child welfare, to overcome a certain amount of this indifference.

We have a State Pediatric Society, which includes all the membership of the Academy in our state. Besides the State Pediatric Society of course, we have the Bureau of Child Welfare of the State Department of Health. At our last meeting of the State Pediatric Society, we evolved a plan of having the Child Welfare Committee cooperate with the Bureau of Child Welfare of the State Health Department and with the Virginia Medical Society and with the Obstetrics Educational Department of the State Society. We have been trying to develop a series of extension courses, patterned after what has been done during the past year by the State Medical Society in the way of prenatal and postnatal work. The State Society has sponsored this course and the work consists of having a series of lectures given

by obstetricians throughout the state in special localities with the approval and under the supervision of the medical societies. Our plan is to hold a series of similar meetings in different parts of the state, to stimulate interest of the general practitioner in the work we are trying to accomplish. That has been started only recently but I hope it is going to accomplish something.

Chairman Mitchell.—There is one other matter of business, to mention to this group. As most of you probably know, it was decided at the last session of the Central States Pediatric Society at Kansas City, that there would be no clinical program next year of that organization and instead, it would meet with Region III of the American Academy. That means there will be no further clinical meetings of the Central States Society. Since a number of members in the Central States felt they would lose a personal contact with the men in this Region, whom they had known for a number of years and had met regularly at the Central States meeting, it was suggested for our consideration that Region II be invited to meet with Region III every three years.

A Member.—You mean interchange meetings?

Chairman Mitchell.—Yes. The first time with Region III and another time with Region II. That would keep up some of the friendships formed in the old Central States.

A Member.—Did you mean that the joint meeting would be only once in three years?

Chairman Mitchell.—Once in three years.

A Member.—And alternate?

Chairman Mitchell.—Yes sir.

A Member.—Is that a business or a clinical meeting?

Chairman Mitchell.—That is a clinical meeting.

Dr. Grulee.—Two and sometimes three days are contemplated.

Chairman Mitchell.—We are invited to meet with them first and after that, they could decide.

Dr. Smith.—I move that we accept the invitation to meet with them in Chicago next year.

A Member.—I assure you that you will all be welcome and you are officially invited. It is just Region III and the Central States.

Chairman Mitchell.—The policy of having joint meetings between Region II and Region III is to be decided in the future. The Central States Committee and Region III want us to let them know whether we wish to agree to that arrangement.

A Member.—We would like to know your opinion about it.

Chairman Mitchell.—It is true that a great many of our friends are in Region III and it would be unfortunate not to continue meeting with them. I think it would be a splendid idea to have a joint meeting every third year.

Dr. Strong.—What action do you want us to take on it?

Chairman Mitchell.—I should like to know whether you care to meet with them every third year and then I will transmit that to them, what arrangement will be made.

Dr. Waring.—I move that we accept the invitation to meet with Region III. Motion duly seconded and carried.

Chairman Mitchell.—Dr. Grulee, have you anything to say?

Dr. Grulee.—Not a word.

American Academy of Pediatrics Regional Committees

Committee on Medical Education

Chairman—Dr. Borden S. Veeder, 3720 Washington Blvd., St. Louis
Dr. Thos. B. Cooley, 7815 Jefferson Ave., E., Detroit
Dr. Jay I. Durand, Cobb Building, Seattle
Dr. James L. Gamble, 33 Edge Hill Road, Brookline, Mass.
Dr. H. F. Helmholz, The Mayo Clinic, Rochester, Minn.
Dr. A. Graeme Mitchell, Cincinnati General Hospital, Cincinnati
Dr. Wm. A. Mulherin, 753 Broad St., Augusta, Ga.
Dr. D. Lesesne Smith, 188 S. Church St., Spartansburg, S. C.

Committee on Hospitals and Dispensaries

Chairman—Dr. Clifford G. Grulee, 636 Church St., Evanston, Ill.
Dr. Murray H. Bass, 57 W. Ninety-first St., New York City
Dr. L. R. DeBuys, 1417 Delachaise St., New Orleans
Dr. Roger H. Dennett, 125 E. Thirty-ninth St., New York City
Dr. Henry Dietrich, 1136 W. Sixth St., Los Angeles
Dr. Lewis Webb Hill, 319 Longwood Ave., Boston
Dr. Geo. F. Munns, 1351 Edgewood Lane, Winnetka, Ill.

Committee on Relation to Section on Pediatrics of the American Medical Association

Chairman—Dr. Hugh McCulloch, 325 N. Euclid, St. Louis
Dr. Lee Forrest Hill, 604 Locust St., Des Moines
Dr. Frank C. Neff, 214 Medical Arts Bldg., Kansas City, Mo.
Dr. Ralph M. Tyson, 334 S. First St., Philadelphia
Dr. William Weston, 1428 Lady St., Columbia, S. C.

Committee on Relation to the White House Conference

Chairman—Dr. A. Graeme Mitchell, Cincinnati General Hospital
Dr. Franklin P. Gegenbach, 1850 Gilpin St., Denver
Dr. Samuel McC. Hamill, 1822 Spruce St., Philadelphia
Dr. Philip Van Ingen, 125 E. Seventy-first St., New York City
Dr. Alfred A. Walker, Highland Plaza Apts., Birmingham

Committee on Relation of Academy to Philanthropic Agencies, Welfare Workers, Public Health Agencies, etc.

Chairman—Dr. Edgar J. Huenekens, 1921 Medical Arts Bldg., Minneapolis
Dr. Wyman C. C. Cole, 5140 Second Blvd., Detroit
Dr. J. Victor Greenebaum, 19 W. Eighth St., Cincinnati
Dr. Theo. C. Hempelmann, 3720 Washington Blvd., St. Louis
Dr. Frank Leech, 1359 Columbia Road, N. W., Washington
Dr. William P. Lucas, 490 Post St., San Francisco
Dr. E. C. Mitchell, 1073 Madison Avenue, Memphis

Committee on Nursing Education in Pediatrics

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Dr. Charles A. Fife, 2104 Spruce St., Philadelphia
Dr. Harry R. Lohnes, 2378 Main St., Buffalo, New York
Dr. Irvine McQuarrie, University of Minn. Med. School, Minneapolis
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Dr. George Mohr, 3604 Victoria St., Pittsburgh
Dr. Harold Coe Stuart, 65 Van Dyke St., Boston
Dr. Frank vander Bogert, 111 Union St., Schenectady, N. Y.
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Committee on Mental Hygiene

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Committee on Clinical Investigation and Scientific Research

Chairman—Dr. Fritz B. Talbot, 270 Commonwealth Ave., Boston
Dr. Joseph Brennemann, 707 Fullerton Ave., Chicago
Dr. Ethel Collins Dunham, 211 St. Ronan St., New Haven
Dr. Henry F. Helmholz, The Mayo Clinic, Rochester, Minn.
Dr. Alfred F. Hess, 16 West Eighty-sixth St., New York City

News and Notes

Americans wishing to contribute papers to the Third International Pediatric Congress to be held in London, July 20, 21 and 22, 1933, must give the titles of their papers to Dr. Henry F. Helmholz, The Mayo Clinic, Rochester, Minnesota, not later than March 15.

Dr. Alfred F. Hess, New York City, will give the Ingleby Lectures at the University of Birmingham in the Summer term of 1933.

Dr. William H. Park, director of laboratories for the New York City Department of Health, has been appointed to the Hermann M. Biggs professorship of preventive medicine at the New York University and Bellevue Hospital Medical College. The Biggs professorship was made possible by a memorial fund established shortly after his death in 1923 and recently increased to a total amount of $200,000 by a bequest of Mrs. Hermann M. Biggs and gifts from William R. Biggs and Mrs. Katherine Biggs McKinney, son and daughter of Dr. Biggs, and the Milbank Memorial Fund.

Dr. Earl D. Bond, Professor of Psychiatry of the University of Pennsylvania, has been awarded the Philadelphia Prize of $10,000. This award was founded in 1921 by Edward W. Bok, publisher, to be given each year to one of the citizens of Philadelphia in recognition of distinguished service rendered to the city. Last year's winner was the "unknown citizen" symbolic of the courage shown by the citizenry in the face of economic reverses.

Dr. Bond has been particularly interested in mental welfare work and has been studying the end-results of postencephalitic conditions in children.

Book Reviews

History of Pediatrics. George F. Still. Oxford University Press, London, 1931, p. 526.

To the pediatrists the world over Dr. Still needs no introduction for his name is linked with a clinical entity. Less well known is the fact that he is the professor of the diseases of children at King's College and consultant to the Great Ormond Street Hospital for Sick Children. A few years ago he was chosen to deliver the Fitzpatrick Lectures on Medical History, at the Royal College of Physicians, London, and these lectures have been expanded into the present volume.

It is an interesting book and should be on the shelves of all pediatrists, but it represents only a part of the subject as it is given over largely to the consideration of the men who wrote books and the books they wrote. As such it is a good turning of the soil preparing it for some one who will eventually write a history which will more or less completely cover the subject in all its phases and set it down against the background of the times.

The book starts with Hippocrates and a brief outline is given of the ancients who busied themselves with the diseases of children. It touches on Bagellardus, who wrote the first printed book on the subject; on Metlinger, who wrote the first work in German and on Roeland, the Flemish physician. A short account is given of the first pediatric poem by Louffenberg and after a chapter on Roesslin takes up in more or less detail the pediatric writings of the sixteenth century. Most of the seventeenth century pediatrists included are not so well known, Ceckius, Zuccharus, Hucher, and the like, but there are some glorious names as witness Glisson, Mayow, Franciscus Sylvius and Sydenham. Daniel Whistler who wrote the first book on rickets and who has been roundly scored by medicine historians comes in for a sympathetic review and doubtless for the first time gets the consideration which may be his due. The eighteenth century is fully covered and among the well-known names one finds many lesser lights. There is an account of pediatrics in each of these centuries and at the end a list of pediatric theses and some other minor writings.

The book represents a great deal of reading and research and is after all Dr. Still's own choice of what he considered worth while. Another might have chosen differently. There are some curious omissions among which may be mentioned Felix Wurtz, one of the noblest of all of the old fellows who interested themselves in children and one of the kindliest. Yet it must be remembered that not everyone who has written on pediatrics can be included in one small volume. The output of those early physicians was enormous. Including the various editions issued the number of pediatric books printed before the end of the eighteenth century runs into many hundreds. Dr. Still is to be congratulated on covering so many of them in such an interesting way.

The value is enhanced by good portraits and reproductions of some of the title pages and illustrations. Another thing which adds charm is the translation of the Latin poems into English verse, at which Dr. Still is quite expert. Taken all in all it is a very welcome contribution to a subject which but few writers have bothered to examine.

JOHN RUHRÄH.

Final Report of the Commission on Medical Education. Columbia University Press, New York, 1932, pp. 560.

The Commission on Medical Education was formed in 1925 by the Association of American Medical Colleges under the chairmanship of President Lowell of Harvard University with Dr. W. C. Rappleye as Director of Study. A group of eminent university and medical educators form the Commission. From time to time interim reports have appeared.

The final report which appeared in December, 1932, is an interesting, comprehensive and thoughtful picture of medical education. It merits reading not only by those directly concerned with medical education, but by every physician who is interested in his profession.

Chapters I and II on the "Public Aspects of Medicine" and "Medical Needs" give the best discussion we have encountered in regard to the present situation and trends of medical service, which is the most important question today in the field of medicine. Insurance, clinics, group medicine, hospital and public health services, and many kindred subjects are adequately discussed. If these two chapters were read by every practicing physician it would obviate much of the loose talk, the passing of foolish resolutions, and the like, which only add to the muddle in which medicine is finding itself today.

Chapter III discusses the supply and distribution of physicians. The remaining chapters are devoted more directly to the subject of medical education. Post-graduate education, the interneship, medical licensure, the medical course, pre-medical education, the cost of medical education, and medical education in Europe form the chapter headings. To these are added an appendix containing 161 tables with the data discussed in the report.

The report as a whole is one of the best we have ever read. It is splendidly written and the presentation shows unlimited thought and study.

Perhaps the question of "specialization" is most interesting to the pediatrician at the present time. We quote some comments from the report.

"Specialism is an essential part of modern medical practice."

"At present about 35 per cent of recent graduates in this country limit their work to a specialty and most of them have not had a sufficiently broad clinical experience."

"The medical profession and the public have a joint responsibility in guaranteeing that those who claim to be specialists are in fact experts in the field.

"A particular identification for those who profess to be specialists should be created, such a recognition to be granted only on evidence of the successful completion of a training which in the opinion of competent physicians is adequate to prepare the individual for practice in the limited field."

BORDEN S. VEEDER.

Comments

ON FEBRUARY 13 the Congress on Medical Education and Licensure held a symposium on "The Recognition of Specialists." The most interesting aspect of the discussion was that not a single speaker questioned the need and necessity of "qualifying specialists." The discussion centered about methods. One speaker representing the existing specialty qualifying boards gave facts and figures in regard to their work, and discussed their methods. The Secretary of the Federation of State Medical Boards expressed the opinion that the function of State Boards was chiefly to maintain a "state registry" of specialists, but that the question of qualification was not one for the state examining boards themselves. A speaker representing the medical schools was of the opinion that the hospitals affiliated with teaching institutions should offer educational opportunities for the training of specialists, but that the qualifying itself was not a university or medical school matter. The Chairman of the Council on Medical Education of the A. M. A. expressed the view that the qualifying of the specialist could properly and best be done by the Council, and referred to their work in the field of clinical pathology and radiology. There was little or no support given to this viewpoint by the other speakers and those taking part in the discussion. The National Board of Examiners' position was stated by their Secretary. After a study of the matter they reached the conclusion that it is not their function primarily, but that they should cooperate with and unify the work of the various specialty qualifying boards. Little or no support was given to the plan recently adopted by the New Jersey State Medical Society and other county societies. This in fact is a return to an earlier method of licensing physicians which was discarded years ago.

Certain basic facts seem to be almost unanimously accepted by those who have studied the matter. These are:

1. That qualification of specialists has become necessary in the United States.
2. That qualification must be based on educational standards of special knowledge and training in some particular field of medicine.
3. That those working in a particular field are best fitted to determine the special knowledge required and pass upon the qualifications of an individual who desires to limit practice to that particular field.
4. That any plan of qualifying must be national rather than local.
5. That there must be cooperation between the specialty qualifying boards, the National Medical Societies, the A. M. A., the various State Boards of Health, and the National Board of Examiners.

THE consensus of opinion at present seems to be that each specialty should organize a qualifying board, national in scope and separate from all existing organizations, with the sole function of qualifying, similar in character to the four boards now in existence. That these boards should be linked together through the National Board of Examiners according to the plan they suggest. That the State Boards of Health by a "State Registry of Specialists," and the American Medical Association through its publications, should give publicity to those who have qualified.

Information in regard to "qualified specialists" should be available not only to the medical profession but to the laity.

The development of special fields of practice in medicine has been an important phase in the development of the medical sciences as a whole. Most young men, however, have been attracted to specialize in recent years by the promise of better economic conditions and returns. The result has been that the various specialties have become so overcrowded that today general practice probably offers a better opportunity from an economic standpoint. We feel that the present economic situation will probably do more to stop the urge to specialize than any other factor. While the gross returns to a specialist are greater than to the general practitioner, the expenses of practice are much greater and much more difficult to cut down when income falls, as it has in the past two years. This, however, has nothing to do with the need for qualifying specialists. What is essential is that some guarantee is needed to both the medical profession and the public that the individual who practices in a limited field has the special knowledge and training which he announces by his action.

ON READING Dr. Joseph Brenneman's "Pediatric Psychology and the Child Guidance Movement."

In ancient days long since gone by
When Solomon was king,
The erring child who strayed from God
Was straightway brought back by a rod
It seemed the proper thing,
And sanctioned by the Holy Writ
The psyche was not hurt a bit.

One hesitates to cast a doubt
Upon the tale as voiced,
The child to elders showed respect
His conduct was most circumspect
The heavenly hosts rejoiced.
They could not pass such angels by
Which made the death rate very high.

Those days were really wondrous days
It scarcely seems 'twas true.
Whate'er the parents chanced to say
The child was taught he must obey
Or else the hour he'd rue.
The ego, in between the id
And superego, smoothly slid.

Behaviorism was unknown
In those old simple days,
No child ere dared to answer back
For if he did he got a crack
Where now we give him praise.
The child was seen and never heard
Psychologists said not a word.

But times have changed, as proverb says,
Old things are obsolete,
We stress the feeding of the child
Which rouses ire and makes him wild,
And now he will not eat.
The more we talk, the more we fret,
The worse the youngster seems to get.

Psychologists now come to aid
With psychiatrists wise
Before the parent dares to chide
The wise guys take the child aside
And psychoanalyze.
They probe his every hope and fear
And wonder why the child is queer.

The clinic doors are opened wide
Professors sit within
The more they strive with their advice
To make the wee one mild and nice
The more the young ones sin.
They wonder what it's all about
And so do I, which lets me out.

IT IS to be regretted that the present economic situation will in all probability decidedly limit the American attendance at the Third International Pediatric Congress in London in July. The first Congress met in Paris before the war. Then came a long hiatus of years and it was not until 1930 that Professor Jundell was able to revive the meetings and the second Congress was held in Stockholm. In order to arrange for the trip at as small an expense as possible it has been decided to arrange a special pediatric trip. The first announcement of this appeared in the "News and Notes" of the last issue. It is estimated that a comfortable pleasant vacation of a month can be made in this way, New York to New York, including two weeks in England, for approximately $600 to $650 per person. This includes tips and other steamer expenses as well as passage, a week in London and a week sight-seeing, first-class hotels, amusements, and the incidental expenses of traveling.